MID-PACIFIC OCEANOGRAPHY, PART VII
HAWAIIAN OFFSHORE WATERS
SEPTEMBER 1952 - AUGUST 1953

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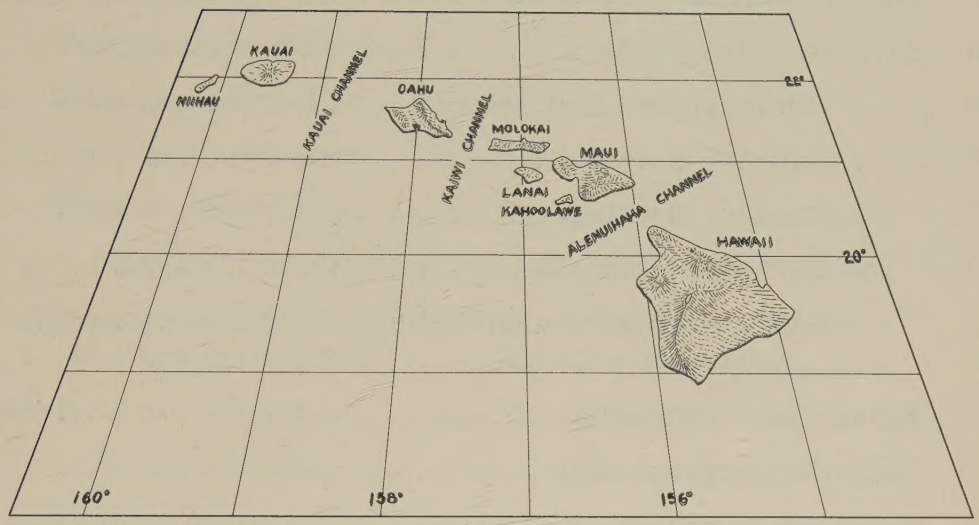

MID-PACIFIC OCEANOGRAPHY, PART VII

HAWAIIAN OFFSHORE WATERS

SEPTEMBER 1952 - AUGUST 1953

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In conjunction with the Pacific Oceanic Fishery Investigations' study of the tuna resources of the central Pacific, the hydrography of Hawaiian offshore waters was investigated during six oceanographic survey cruises. The first three of these, Hugh M. Smith cruises 1, 10, and 12 of December 1949, July 1951, and October 1951, were analyzed and recorded by McGary (1955). This report covers the remaining cruises 17, 20, and 21 of the Hugh M. Smith, which took place September 5 to September 15, 1952, February 25 to April 4, 1953, and August 4 to August 26, 1953 respectively. On Hugh M. Smith cruise 26, May and June 1954, additional oceanographic data were obtained in conjunction with skipjack scouting. These have not been analyzed in this report but are tabulated in the appendix.

The principal observations consisted of routine temperature and salinity sampling together with 200-meter oblique plankton hauls.[1/] Reliable inorganic phosphate-phosphorus data were obtained on cruise 21. The hydrographic data were collected and processed by methods described by Cromwell (1954), Stroup (1954), and McGary (1955).

Each cruise is discussed separately using a similar outline for each. A short summary of the cruise report is given first to indicate the nature of the observations. This is followed by a brief summary of the weather conditions encountered during the cruise.

The hydrographic data are then analyzed in two major groups, first those from the surface layer and then those from the subsurface layers. In the former the distributions of temperature, salinity, density, and surface geostrophic currents are emphasized. In the latter, attention is focused on the subsurface distribution of mass and how it contributes to the surface currents. The results of these analyses are then briefly summarized.

The report is concluded with a general summary in which the observations for each cruise are compared in order to point to possible seasonal variations. The tabulated observations for each cruise are included in the appendix.

The discussion is generally based on figures in which the variables are plotted and contoured on horizontal surfaces with points of observation marked by dots. As is generally the case, contour lines

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[1/] The plankton data for cruise 17 have been presented by King and Hida (1954). Those for cruises 20 and 21 are in preparation for separate publication.

represent an interpretation of the distribution of a variable and therefore may be open to dispute. The figures of this report are no exception. However, no observed points are violated and interpolations are generally linear except when boundary conditions suggest a deviation.

In order to obtain average values of temperature, salinity, etc., and their spatial trend, the survey region was subdivided into four areas. A line was drawn along the Hawaiian Island chain and another perpendicular to it through the western tip of Molokai island, as shown on figure 1. These lines divide the region into a windward (northeast) and a leeward (southwest) side with an east and a west section in each.

HUGH M. SMITH CRUISE 17

Summary Cruise Report

The cruise began September 5, 1952, and was completed September 15, 1952. Figure 1 shows the positions of the 31 hydrographic stations. Water samples were taken to a depth of 600 m. and oblique 200-m. zooplankton hauls were made on each station. Bathythermograph temperatures to 900 feet were obtained on each station and at 10-mile intervals. Synoptic weather observations were made four times daily and forwarded to the U. S. Weather Bureau.

Meteorological Conditions

Typical trade wind weather prevailed during the cruise period. Air temperatures were predominantly 77°F., with the exception of the portion southwest of the island chain, where the maximum deviations of $\pm$ 2°F. occurred and where the temperatures were generally slightly above 77°F. Winds were generally from 090° $\pm$ 20°T. with the exceptions of a few stations to the lee of the island chain where the deviation reached a maximum of $\pm$ 60°. No winds with a westerly component were observed. Speeds were generally between 15 and 20 knots, with extremes of 6 and 22 knots. No rain was encountered except on stations 8 and 14.

Surface Hydrography

The hydrographic conditions of the surface layer (upper 50 to 100 m.) are of importance since their variations have a primary

influence upon biological activities. Here the salinity and temperature, which determine the density of the water, show their greatest seasonal variations.

Besides effects due to the physical presence of the Hawaiian Islands in an ocean stream, one might expect the surface variables to be influenced by heavy precipitation on the windward slopes of the island mountains and subsequent runoff. The surface temperature is also expected to vary because of solar heating in shallow water and in wind-sheltered regions.

Temperature distribution

Surface bucket temperatures obtained at each bathythermograph position are contoured on figure 2 at intervals of 0.5°F. Surface temperatures averaged over the quadrants of the survey region are shown in table 1 together with the extreme temperatures encountered. Greatest deviations occurred on the leeward (southwest) side of the island chain. The maximum temperature of 80.5°F. was found off the west shore of the island of Hawaii. The lowest temperatures were found in an area centered at 20°N., 157°20'W., where the minimum was 74.8°F. (This type of cold temperature distribution was previously shown by McGary (1955) to be associated with a counterclockwise vortex.) On the windward (northeast) side of the island chain temperatures were more uniform, with two tongues of warmer water protruding north and northeastward of Molokai and Maui, respectively. On the windward side there was essentially no change in average temperature from east to west, whereas on the leeward side the average increased by approximately 1°F. in that direction.

Salinity distribution

Figure 3 shows the surface salinity distribution contoured at intervals of 0.05 °/oo. Averaged surface salinities are shown in table 1. Maximum salinities (greater than 35.2 °/oo) were encountered on the northern and eastern edges of the survey area and minimum salinities (less than 35 °/oo) off the west shore of Hawaii and along the southern edge of the survey area. A region of high-salinity water on the leeward side of the island chain is centered at approximately 19°45'N., 157°20'W., the same location as the temperature minimum.

Table 1.--Average surface temperatures, salinities, and densities in the quadrants of the survey region. H. M. Smith cruise 17

	Overall average	Northeast of island chain				Southwest of island chain			
		East	West	Over-all	Ex-tremes	East	West	Over-all	Ex-tremes
Temp. (^{o}F.)	78.0	77.6	77.5	77.6	79.0 77.0	78.0	79.2	78.6	80.5 74.8
Salinity (^{o}/oo)	35.12	35.18	35.15	35.15	35.33 35.05	35.08	35.05	35.06	35.28 34.95
Density (σ_t)	23.25	23.37	23.34	23.36	23.58 23.04	23.23	23.05	23.14	23.67 22.80

Density distribution

The surface density of sea water is a function of the independent variables temperature and salinity. Their relative importance can be judged when one considers that the change of surface density in the Hawaiian Islands region due to a 0.3 ^{o}/oo salinity decrease is approximately equivalent to a 1.6 ^{o}F. temperature increase. Thus, changes in salinity as shown in table 1 are not negligible in their effect on the density.

Figure 4 shows the surface density distribution in units of sigma-t with contour intervals of 0.1. When compared with figures 2 and 3, it indicates that the main features of temperature and salinity had an additive effect upon the density distribution; that is, whenever the temperature was low, the salinity was high, and conversely low salinities corresponded with high temperatures.

Average surface sigma-t values are listed in table 1. The lowest densities occurred on station 1 and off the west shore of Hawaii. The densest water was found in a region centered at 20^{o}N., 157^{o}15'W. associated with the counterclockwise vortex. The average density increased from south to north and from west to east.

Surface circulation

It is not always easy or desirable to make direct current measurements in order to obtain the circulatory pattern of a region.

Local fluctuations may obscure the average circulation completely, especially when the observations are made over a short period of time. In one convenient method of indirect current measurement the difference of the vertical distribution of mass (specific volume) between two stations is used to calculate the component of the current vector normal to the line between the stations. There are some essential assumptions which must be satisfied. The region under consideration must be several degrees of latitude removed from the Equator, a steady state must exist (no accelerations), and dissipative forces such as friction must be negligibly small. Another problem in these computations is the proper choice of a reference level, the surface along which no component of gravity acts. It is usually assumed that at a depth where the specific volume change of the water between stations is small compared to that in the surface layers, the isobaric surface is "level", i.e. changes are so small that they will not materially change the computed currents in the surface layers. To be precise, the computed surface currents are relative to those at the reference level.[2/]

When the method of computing "relative currents," based on the "distribution of mass," is applied to the Hawaiian Islands region, it is assumed that the restrictions mentioned above hold. However, because of the boundary effect of the islands, the steady state and the friction assumptions may not be exactly satisfied, particularly in places of high current speeds. Distortions in the calculated circulation pattern may therefore exist, but they are not expected to materially change its principal features.

Figure 5 shows the geopotential topography[3/] in dynamic meters, of the sea surface referred to 600 m.[4/] The outstanding feature is the counterclockwise, rotary current motion or vortex centered at about 19°45'N., 157°20'W. with speeds on the order of 1 to 2 knots. There

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[2/] A more detailed, non-mathematical discussion can be found in Sverdrup et al. (1942:389-395).

[3/] Also referred to as geopotential surface, dynamic topography, dynamic heights, or dynamic height anomalies.

[4/] Strictly speaking the reference level in dynamic computations is an isobaric surface. However, under the assumptions used, this surface is so close to an isobathic surface that, for simplicity, meters will be used to designate the reference depth.

are two smaller, clockwise vortices, one off the west shore of the island of Hawaii and one northwest of the counterclockwise vortex. West of these vortices, a 0.2-knot current sets north and is deflected westward south of Kauai Channel.

On the windward side of the island chain the current pattern is weak except east of Hawaii Island, where a 1/2- to 1-knot current is setting south, and in the region northeast of Kauai, where a 1/2-knot current sets first southwest and then changes to west north of Kauai. The dynamic topography north of the island of Hawaii between 20° and 22°N. indicates a westerly setting drift from east of the survey region which is deflected to the south.

The geopotential topography both north and south of Kauai Channel indicates no transport of water through the channel but a flow normal to its axis in a westerly direction. In Alenuihaha Channel a slow current setting to the northeast is indicated.

Surface temperature, salinity, and density and the surface circulation

Figures 2, 3, 4, and 5 show that the major features of temperature, salinity, and density compare well with the dynamic topography, remembering that in the northern hemisphere the light water is to the right of the observer facing in the direction of the current (Sverdrup et al. 1942: 394). In the center of the counterclockwise vortex the temperature is low, the salinity high, and therefore the density is high. The two clockwise vortices are not as easily recognized from the surface distribution of variables, although the high temperatures west of Hawaii suggest one of them. The other vortex is located in the zone of high current shear between the counterclockwise vortex and the northerly drift.

The slow clockwise circulation about the island of Hawaii can also be inferred from the warmer and fresher inshore waters. According to the dynamic topography the tongues of warmer water protruding north and northeastward of the islands of Molokai and Maui do not indicate a flow of water in those directions as much as an intrusion of colder water north of Oahu and northeast of Alenuihaha Channel.

Thus, north and south of the portion of the island chain between Oahu and Maui, there is good agreement between the circulation patterns obtained from the surface density and from the dynamic topography. West of this region and northeast of Alenuihaha Channel there is a considerable difference. In the southwest part of the survey region and

northeast of Alenuihaha Channel the light water is actually to the left of the current direction; in the northwest part the direction of flow is perpendicular to that expected from the density distribution.

The over-all surface density distribution in the survey region leads to the assumption that the water generally flows in a southeasterly direction, which is contrary to the surface dynamic heights. These apparent discrepancies in the rule of direction of flow can be explained by considering the subsurface distribution of mass.

Subsurface Circulation

A qualitative picture of the three-dimensional subsurface circulation can be obtained by plotting variables on one of several systems of coordinates. Each of these presentations will illustrate features which are missed in others. The distribution of temperature, salinity, sigma-t, oxygen, phosphate, or depth can be presented on vertical planes (sections). A vertical section of sigma-t, for example, is most useful when it cuts the direction of flow at right angles. It then gives an indication of relative current speeds. The distribution of parameters can also be plotted on "horizontal" planes which are approximately parallel to the sea surface (surfaces of constant pressure or depth). This method is particularly useful in regions with a complex current system, such as is encountered in the vicinity of the Hawaiian Islands. Its shortcoming is that vertical gradients are not apparent.

A useful variation of either method is the use of one of the parameters as a coordinate. Such a parameter is the potential density, which is particularly useful since particle motion takes place along surfaces of constant potential density. (The potential density, approximately expressed in units of sigma-t, is the density a particle of water would have if brought to the surface without loss or gain of heat.) The deduction of the flow pattern from the distribution of variables on these "sigma-t surfaces" is generally known as isentropic analysis (Montgomery 1938).

On a horizontal frame of reference, then, one can plot the depth of a sigma-t surface and obtain its bathymetric chart. For these depths and on the same chart the salinity can then be plotted. Together, the isopleths of depth and salinity referred to a surface of constant sigma-t might give an indication of the direction of flow.

The isobaths are generally parallel to the flow, provided that the slopes of the sigma-t surfaces below are in the same direction. The

direction can be obtained by the use of the rule previously stated. Deep isobaths represent columns of lighter water below the surface and therefore will be to the right of an observer facing in the direction of flow.

Flow takes place along the sigma-t or quasi-isentropic surfaces (Sverdrup et al. 1942:414-416), across which mixing is at a minimum. Thus, identifying properties of a water mass, such as salinity and temperature, would be retained longest in the direction of flow or, conversely, the direction of flow would be along the minimum change of the identifying property such as salinity.

These principles will be used in an attempt to interpret the subsurface circulation.

Figure 6 shows the sigma-t distribution plotted on a vertical plane extending from west to east through stations 1, 10, 14, 22, 21, and 30. The dominating feature of the section is the wave-like distribution of sigma-t west of station 22. The rising isopleths east and west of station 14 are associated with the "doming" of the sigma-t surfaces which characterize the counterclockwise vortex mentioned before. The rule of direction of flow indicates a current setting north between stations 22 and 14 and one setting south between stations 14 and 10.

The section between stations 1 and 10 demonstrates that the surface density distribution may give a misleading picture of the surface current pattern. The 23.0 sigma-t isopleth slopes from 20 m. at station 1 toward the surface at station 10, whereas the 23.2 sigma-t isopleth and all those below its depth slope down. Thus, the surface density indicates a southerly component of flow when in reality there exists a strong northerly component.

East of station 22, the varying slopes of the sigma-t isopleths make estimation of the surface current speed and direction difficult without actual dynamic computations. In Alenuihaha Channel (stations 22 to 21) the absence of a pattern associated with well-developed currents is to be expected, since a strong flow normal to the channel direction is not likely.

The depth variations of the 27.0 sigma-t isopleth west of station 22 shows that the distribution of mass associated with the counterclockwise vortex extends to depths greater than 600 m. It also indicates the possibility that currents at that depth are not negligible. But since the direction of slope of the isopleth is the same as those above, the error

is expected to be in magnitude of the surface currents only and not in their direction.

The salinity distribution is also shown in figure 6 by means of dashed lines (isohalines). A salinity maximum is generally to be found at approximately 100 m. and a minimum at approximately 400 m. The salinity maximum east of station 22 is greater than 35.2 °/oo and west of station 14 less than 35.2 °/oo. In the vicinity of the counterclockwise vortex this salinity structure has broken down with a disappearance of the maximum, which now occurs as a pocket at the surface.

A better over-all picture of the circulation can be obtained from the bathymetric charts of sigma-t surfaces. Figure 7 shows a series of charts for the depths of the 26.5, 26.0, 25.5, 25.0, 24.5, and 24.0 sigma-t surfaces which will convey to some degree the three-dimensional changes in the distribution of mass associated with the circulation. The dashed lines indicate the salinity distribution on the sigma-t surfaces. However, due to the complexity of the circulation and to lack of detail and precision, the usefulness of salinity as a tracer is considerably impaired, so the flow pattern will be deduced from the isobaths.

According to the 26.5 and 26.0 sigma-t surfaces, the direction of flow north of the island chain is from east to west and the deflecting effect of the islands of Hawaii and the group from Maui to Oahu is apparent. The 25.5 and 25.0 sigma-t surfaces indicate a general change of direction to the northeast in the same region. Finally the 24.5 and 24.0 sigma-t surfaces show a southeasterly drift on the windward side except north of Kauai and Kauai Channel, where the flow is from the north.

South of the island chain the flow on the 26.5 sigma-t surface is generally toward the northwest. The position of the counterclockwise vortex is clearly indicated by the 380-m. isobath. The other surfaces show that the vortex features become increasingly dominant toward the surface. In the survey region south of Kauai the northerly component of flow prevails up to the 24.0 sigma-t surface.

In figure 7 the layers which are identified by constant sigma-t values can be considered as independent current systems which, when added together, produce the net surface current. This, essentially, is done in dynamic calculations, using isobaric rather than sigma-t reference surfaces.

The three-dimensional water body of the survey region, extending down to 600 m., can be separated into the surface layer and two intermediate layers. The upper intermediate layer is centered about the salinity maximum, corresponding approximately with the 24.5 sigma-t surface (see fig. 22 for typical temperature-salinity diagrams). The lower layer is centered about the salinity minimum, corresponding approximately with the 26.5 sigma-t surface. The distribution of mass in each is associated with a current pattern and these patterns, when added vectorially, give the net surface circulation. Thus figures 8 and 9, the geopotential topographies at 300 m. relative to the 600-m. level and the geopotential topography at the surface relative to the 300-m. level, illustrate the relative flow pattern of the lower intermediate layer and the upper intermediate layer (including the surface layer), respectively. These, when added, give the surface circulation relative to the 600-m. level (fig. 5).

Bathythermograph Data

Figure 10 represents the vertical bathythermograph temperature distribution oriented in sections from north to south along the lines of stations. At this stage of analysis little additional information can be obtained from these figures, and they are included as a record only. The counterclockwise vortex is clearly indicated by the rising isotherms between stations 12 and 15.

Summary of Cruise

The survey data obtained on cruise 17 of the Hugh M. Smith represent typical summer conditions with normal trade wind weather prevailing. The counterclockwise vortex west of Hawaii was found on previous cruises, which have been discussed by McGary (1955). Two circulation systems were emphasized, the lower intermediate which is associated with the salinity minimum and the upper intermediate which is associated with the salinity maximum. The former consisted of westerly-setting currents north of the island chain which showed the effect of the island barrier. The latter indicated southerly-setting currents impinging on the island chain which were deflected to the southeast by the island group from Oahu to Maui. On the leeward side the upper intermediate circulation was dominated by the counterclockwise vortex. The results of these two systems, together with the surface distribution of mass, is a rather complicated net surface pattern as shown by the geopotential topography (fig. 5).

HUGH M. SMITH CRUISE 20

Summary Cruise Report

Cruise 20 of the Hugh M. Smith extended from February 25, 1953, to April 4, 1953. The area covered was essentially the same as that of previous survey cruises in the offshore waters of the Hawaiian Islands, except for the extension of the western limit to 161°30'W. and the southern limit to 17°20'S. In addition there were two exploratory lines of stations up to 29°N. along 155°W. and 158°W.

Figure 11 shows the position of the 69 hydrographic stations where water samples were collected to a depth of 1,000 m. Oblique zooplankton tows were made to a depth of 200 m. on each station except station 34, where a surface tow was made. Other observations were as follows: bathythermograph lowerings on each station and one between stations; four daily synoptic weather observations, which were passed on to the U. S. Weather Bureau; and GEK observations at each bathythermograph position. These latter were made with unfloated electrodes except on 33 occasions where duplicate GEK runs were made with floated electrodes.

The hydrographic survey part of the cruise began on March 9, 1953. Station 12 was occupied March 15 so that the region south of 24°N., the main survey region, was covered in 19 days.

Meteorological Conditions

No greatly varying weather conditions were encountered throughout the cruise. North of latitude 24°N. the air temperature decreased from 71°F. to 66.5°F. at stations 6 and 7. The average temperature over the whole of the main cruise area was 73°F. Within this area the average air temperature encountered north of the island chain was 72°F., with extremes of 71°F. and 75°F., and to the south it was 74°F. with extremes of 73°F. and 77°F.

Winds were predominantly from 080°T. and ranged from 40° to 130°T. On only ten stations did they have a southerly component. Wind speeds were predominantly within a range of 15 to 22 knots. On only six stations was it greater than 22 knots, with a maximum of 30 knots. Calmer weather (winds less than 15 knots) prevailed during the latter part of the cruise, between stations 52 and 61.

Light rain was encountered on five stations which were scattered throughout the cruise.

Surface Hydrography

The average surface temperature, salinity, and density (sigma-t) in the quadrants of the main survey region are listed in table 2, together with the extremes encountered. The distribution of these variables is discussed below.

Table 2.--Average surface temperatures, salinities, and densities in the quadrants of the survey region, H. M. Smith cruise 20

	Overall average	Northeast of island chain				Southwest of island chain			
		East	West	Over-all	Ex-tremes	East	West	Over-all	Ex-tremes
Temp. (°F.)	74.3	73.5	73.5	73.5	74.3 71.8	74.8	74.9	74.9	76.3 73.4
Salinity (°/oo)	35.00	35.06	35.18	35.11	35.34 34.45	34.75	35.08	34.91	35.33 34.42
Density (σ_t)	23.76	23.93	24.05	23.98	24.35 23.34	23.49	23.74	23.61	24.15 23.27

Temperature distribution

The surface bucket temperatures obtained at each bathythermograph position are contoured on figure 12 at 0.5°F. intervals. The minimum temperature of 71.8°F. south of 24°N. was measured at station 12 and the maximum of 76.3°F. at station 56. Average temperatures showed no significant change from east to west on either side of the island chain.

There were no outstanding features, such as centers of cold or warm water, in the surface temperature distribution. A tongue of warm water extended from the vicinity of stations 59 and 60 northeastward, branching toward Molokai and Hawaii. Two other tongues of relatively warm water extended northward north of Alenuihaha Channel toward station 13 and north of Molokai toward station 24.

In the exploratory section north of 24°N. the surface temperature assumed a more regularly decreasing pattern toward the north. South of 26°N. temperatures tended to increase toward the west, whereas north of this latitude they decreased toward the west.

Salinity distribution

Figure 13 shows the distribution of surface salinity contoured at 0.1 °/oo intervals. As in the case of the surface temperature distribution, there were no outstanding features. Relatively large salinity gradients were encountered east of Hawaii and between 159°W. and 160°W. along the southwest edge of the survey region. A tongue of high salinity water extended south toward and through Kauai Channel until south of Kauai it turned west.

Table 2 shows that the average salinity increased from east to west on each side of the island chain, with extremes of approximately 34.4 °/oo and 35.3 °/oo. Considering the whole cruise area, the salinity increased on the average from south to north, reaching a maximum at approximately 26°N., and then decreased towards 29°N. South of 26°N. the salinity increased from east to west whereas north of this latitude it decreased.

Density distribution

Figure 14 shows the surface density (sigma-t) distribution with contour intervals of 0.1. Both north and south of the islands the density, on the average, increases toward the west, and when figures 13 and 14 are compared, other similarities between the isopleths of salinity and sigma-t become apparent. Some of these are the relatively large gradients east of Hawaii, between 159°W. and 160°W. at the southern edge of the survey region, and high and low salinities south of Kauai and in the vicinity of station 49 which correspond with pockets of high and low sigma-t values, respectively. Thus, south of the island chain the salinity materially influences the surface density distribution, becoming less important on the windward side until north of 24°N. the temperature plays a dominant role.

It was noted above that at 26°N. the salinity and temperature show changes in trend. These are also reflected in the surface density distribution (fig. 14), suggesting that 26°N. may be the southern boundary of a region generally referred to as the subtropical convergence. (See p. 15, Subsurface Circulation.)

Surface circulation

Figure 15 shows the surface circulation represented by the dynamic topography relative to 1,000 m. The survey region is dominated by a number of vortices, some cyclonic, others anticyclonic (counterclockwise, clockwise), centered in the vicinity of stations 49, 39, 1, and 23. The

latter is a large circulatory system which extends from approximately 21°N. to 27°N.

Regions of high current velocities (of the order of 1 to 2 knots) are found in the vicinity of stations 44, 42, 50, 58, west of station 12, and elsewhere. Most of these are on the periphery of the vortices mentioned above.

Figure 15 also shows that the area north of 27°N. is one of stagnation (no currents) except for a northeasterly drift in its northwest section.

Geomagnetic Electrokinetograph (GEK) observations

The GEK (von Arx 1950) observations are plotted on figure 16 in which the arrows indicate the direction of flow and numbers the speed in cm./sec.

On 33 GEK stations duplicate determinations were made with floated (dotted arrows) and unfloated electrodes in order to determine the validity of the "droop" correction (McGary 1955:8). Figure 16 shows that in many cases there was good agreement between the two methods. For a number of observations, however, the currents obtained by the two methods were 90° or more apart, particularly when the GEK indicated low current speeds.

The GEK data have been presented only as a record, and no detailed analysis in relation with the geostrophic[5/] currents has been attempted. However, a superficial comparison between the two methods of obtaining surface currents shows some resemblance, particularly in regions of high current speed. North of 26°N., in the region of weak currents, there is little agreement between the two methods. The region south of 24°N. is one of much vortex activity where it is reasonable to expect vortices both of smaller dimensions and shorter life. Here the GEK which measures essentially instantaneous currents, would be expected to deviate from the geostrophic flow.

Surface temperature, salinity, and density and the surface circulation

It would be desirable to be able to interpret the flow pattern from the distribution of the surface salinity, temperature, and density. In the lee of the island chain some confirmation of the flow pattern is derived

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[5/] Geostrophic currents are those obtained from the geopotential topography.

from these variables. For example, one branch of the forking tongue of warm water is associated with the high velocity current in the vicinity of station 50, and the other with the current at station 42. The latter current continues past the southern tip of Hawaii and corresponds to the large salinity and density gradient in that region. The clockwise vortex centered in the vicinity of station 49 is again apparent from both the salinity and density distribution, as is also the southeasterly setting current near station 58. In Kauai Channel the tongue of high-salinity water is compatible with the dynamic topography, which shows a strong southwesterly setting current coming from the vicinity of the high-salinity source area northwest of the main survey region.

North of the island chain the surface variables are of little help in deducing the flow pattern and, as before, it is expected that the subsurface distribution of variables will help to clarify the picture.

Subsurface Circulation

As in the case of cruise 17, investigation of the subsurface circulation involved the two intermediate systems. The depth of the 24.5 sigma-t surface associated with the salinity maximum and the depth of the 26.5 sigma-t surface associated with the salinity minimum are shown in figures 17 and 18. They indicate that the vortices revealed by the surface dynamic topography do not always extend through the two intermediate flow systems. For example, the vortex near station 39, southwest of Oahu, is clearly apparent on figure 17 but not on figure 18, whereas that at station 49 is apparent on both sigma-t surfaces. North of the island chain the vortex at station 23 is apparent on figure 17 only, and that at station 1 is well pronounced on the 26.5 sigma-t surface only. To illustrate that the complex surface structure extends to great depths, figure 19, showing the depth of the 27.2 sigma-t surface, has been included.

It is interesting to note in figure 17 the rise of the 24.5 sigma-t surface northward until at approximately 26°N. it reaches the sea surface. On the basis of isentropic theory this would be the latitude where the maximum salinity water originates (Sverdrup et al. 1942:141-146).

In figure 20, showing the surface dynamic heights relative to the 300-m. level, the four vortices mentioned above are readily distinguishable.

In figure 21, the dynamic heights at 300 m. relative to the 1,000-m. level, the vortex at station 49 appears considerably weaker and that at station 39 is indistinguishable. North of the island chain the vortex at

station 23 has all but disappeared, whereas that at station 1 has retained a strength similar to that which it showed in the upper layer. Thus the two systems added together give a generally intensified surface flow relative to the 1,000-m. level.

So far the complex current pattern has given no information about any net circulation through the survey region. To gain an understanding of this the dynamic heights of figures 15, 20, and 21 were averaged in each of the four sections of the survey region and north of 24°N. in the exploratory region. These averages are shown in table 3 below.

Table 3.--Average dynamic heights in the quadrants of the survey region

	North of main survey region	Windward side		Leeward side	
		West	East	West	East
300 m. re. 1,000 m.	.96	.84	.81	.82	.81
Surface re. 300 m.	.84	.94	.93	.96	1.00
Surface re. 1,000 m.	1.75	1.78	1.74	1.79	1.81

This shows that there is a westerly drift of the lower intermediate water mass in the northern portion of the cruise area. In the main survey region there appears to be a slight southwesterly drift. The surface circulation relative to the 300-m. level shows a drift, slightly stronger than the intermediate, setting southeast. These two combine to give a net southeasterly surface drift relative to 1,000 m. along the island chain and little net flow in the northern section of the survey region.

Further interesting information can be obtained from an analysis of the salinity minimum. This was suggested by the characteristic shape of temperature salinity diagrams, some of which are shown in figure 22. At station 5, for example, the temperature, salinity, depth, and sigma-t of the salinity minimum are 5.3°C., 33.97 °/oo, 620 m., and 26.8 respectively. At station 62 these same variables are 11.3°C., 34.18 °/oo, 270 m., and 26.1. These are the extreme values, the former representing a type of water found in the northern section of the cruise area, and the latter a type found in latitudes south of the island of Hawaii. Values between these extremes are found throughout the remainder of the survey area. Some of the curves also indicate a double minimum, such as at stations 61 and 64

(fig. 22). This suggests that the islands are located in a region bounded by intermediate water masses from a different source and supports the schematic figure 202 in Sverdrup et al. (1942:717).

Also interesting to note is the shape of the T-S curve at the salinity minimum. There are a number of stations such as station 29 (fig. 22), where the salinity remains essentially constant between the extremes of sigma-t mentioned above, which might suggest mixing of the two types of water.

To illustrate these observations, figure 23 has been prepared showing schematically two types of water at the salinity minimum which were separated arbitrarily at 26.5 sigma-t. Cross-hatched zones include the stations of constant salinity throughout the sigma-t range. The lack of a more definite flow pattern on this diagram is in agreement with the averaged dynamic heights for the lower intermediate flow, which show only a weak net circulation.

Bathythermograph Data

Bathythermograph data are again included as a record only in vertical sections on figure 24.

Summary of Cruise

Cruise 20 of the Hugh M. Smith took place during oceanic winter conditions with trade wind weather.

The hydrographic data showed considerable complexity extending down through the salinity minimum layer with four major vortices which obscured any mean flow pattern. Average dynamic heights at 300 m. relative to 1,000 m. indicated a southwesterly drift through the main survey region. Those at the surface relative to the 300-m. level revealed a slightly stronger easterly drift. These two systems combined to give a net easterly flow along the island chain and no net current in the northern section of the survey region.

The large number of vortices show that the survey region is one of dissipation of energy with little or no net transport. The absence of any "streams" impinging on the island chain either at surface or intermediate depths suggests the existence of mechanisms for vortex generation other than those associated with current shears.

HUGH M. SMITH CRUISE 21

Summary Cruise Report

The cruise began August 4 and was completed August 25, 1953, with the occupation of 69 stations whose location is shown in figure 25. All of these were hydrographic stations with sampling depths to 500 m. except 23 and 33, which were trawl stations. Three duplicate sets of four stations were occupied in Kaiwi Channel, but only stations 28, 29, 30, and 31 of these are used in the analysis in order to provide better continuity in time. Station 5 was occupied on August 6 and station 65 on August 24, so that the survey region was covered in 18 days.

Other observations included 200-m. oblique plankton tows and bathythermograph and GEK observations at each station and at 20-mile intervals. Four daily synoptic weather observations were made and passed on to the U. S. Weather Bureau.

Meteorological Conditions

Typical trade wind weather was encountered during the cruise. The overall average air temperature was 77.3°F. On the windward side the average was 76.6°F. and on the leeward side 77.8°F. The lowest temperature of 75.1°F. was encountered at station 9 and the highest, 81°F., at station 32 in the immediate lee of Lanai Island. Of the winds which were measured on the hydrographic stations, 65 percent were from 070° to 090°T.; 90 percent of the winds came from 050° to 120°T. The winds had an extreme southerly component on only two occasions, namely on stations 37 and 38 when the direction was 220°T. and 170°T., respectively. The measured wind speeds were 46 percent between 17 and 21 knots, 30 percent between 11 and 16 knots, 12 percent greater than 21 knots, and 12 percent less than 11 knots.

The weather was generally fair except on stations 5 to 8, 37, and 46, when showers were encountered.

Surface Hydrography

The distribution of the surface temperature, salinity, and density are again discussed separately. Table 4 shows these variables averaged over the quadrants of the survey region together with the extreme values encountered.

Table 4.--Average surface temperatures, salinities, and densities in the quadrants of the survey region, H. M. Smith cruise 21

	Overall average	Northeast of island chain				Southwest of island chain			
		East	West	Over-all	Ex-tremes	East	West	Over-all	Ex-tremes
Temp. (°F.)	78.0	76.9	77.2	77.0	77.7 76.3	78.3	79.0	78.6	79.5 76.6
Salinity (°/oo)	34.99	35.06	34.99	35.02	35.27 34.79	34.92	35.02	34.97	35.11 34.82
Density (σ_t)	23.18	23.43	23.32	23.37	23.52 23.21	23.10	23.02	23.07	23.47 22.92

Temperature distribution

The surface bucket temperatures obtained at each bathythermograph position are contoured on figure 26 at 0.5°F. intervals. As during cruise 17 (September), the greatest deviations occurred on the leeward side, where maximum temperatures of about 79.5°F. were found west of the island of Hawaii, in the vicinity of station 37, along the southern border of the survey region between stations 59 and 65, and between stations 40 and 41, south of the island of Oahu. The coldest water, 76.6°F., on the leeward side of the island chain was found in the southeast section of the survey region and in a pocket at station 51. On the windward side the temperatures were more uniform, as was also the case during cruise 17, and ranged from 76.3°F. in the east to 77.7°F. in the west.

The increasing average temperatures from east to west on both sides of the island chain suggest that there exists a net surface flow with a westerly component, considering that the survey region is located within latitudes of net gain of heat energy. On the leeward side, the higher temperatures and the greater deviations suggest a slower surface transport to the west. Noteworthy is the horizontal temperature gradient along the island chain. This and the other features point to the assumption that water with a westerly component of flow is impinging on the island chain, which provides an effective barrier.

Salinity distribution

Figure 27 shows the surface salinity distribution contoured at 0.1 °/oo intervals. On the windward side the maximum salinity of 35.27 °/oo was found at station 8 and at stations 10 and 15, in a tongue extending from north to south toward the island of Hawaii, where the salinity was 35.26 °/oo. The lowest salinity, 34.79 °/oo, was found at station 5. On the leeward side the maximum salinity of 35.11 °/oo was found at station 63 and the minimum of 34.82 °/oo at station 58, both along the southern boundary of the survey region. Also of interest is the pocket of higher salinity at station 51. In general, the average salinity decreased westward north of the island chain whereas it increased in that direction south of the islands.

An isolated pocket of low salinity water (34.55 °/oo), lower than the minima mentioned above, was found at station 26 in Kauai Channel. Although this seems unreasonably low, no reason such as faulty sampling or chemical analysis can be found to discard the observations.

Density distribution

The surface density distribution in units of sigma-t was contoured at 0.1 intervals on figure 28. It shows that on the windward side the extreme sigma-t values were found at station 5, where the minimum was 23.21, and at station 10, where the maximum was 23.59. On the leeward side the highest sigma-t value, 23.47, was found at station 51, and the lowest, 22.92, at station 35 west of Hawaii and station 40 south of Oahu.

Figures 26, 27, and 28 indicate the relative influence of temperature and salinity in the density distribution. For example, the surface temperature and density show the feature of relatively large horizontal gradients along the island chain, which is absent in the salinity distribution. One can also note the pockets of warm water south of Oahu and west of Hawaii corresponding with lower densities in the same regions.

On the windward side of the island chain one can detect the influence of salinity in the surface distribution of density. For example, north of the island of Hawaii the tongue of saline water extending from north to south is reflected in a tongue of denser water in spite of higher surface temperatures. This indicates that the salinity has become the dominant variable in the density distribution. At station 51, on the leeward side, it can be seen how both low temperature and high salinity contribute to the high density, which, as before, is associated with a counterclockwise vortex.

In general, the average surface density decreases from east to west and south to north. Thus, remembering that in the northern hemisphere the light water is to the right of an observer facing in the direction of flow, the density distribution suggests that the contribution to the net surface flow is a relative current setting southeast.

Surface circulation

For cruise 21 dynamic calculations are limited to the upper 500 m. These depths (500 m.) are approximately the depths of the salinity minimum during this cruise. A considerable part of the contribution toward the surface flow due to the intermediate distribution of mass is therefore not shown. This, however, is not expected to change materially the presentation of the main features of the circulation.

The dynamic topography at the surface relative to the 500-m. level (fig. 29) shows that the survey region is again one with a complex flow pattern. There appear in the lee of the islands three vortices. Two of these, centered in the vicinity of stations 47 and 51, show a counterclockwise rotation, and the larger, third vortex, centered in the vicinity of 20°N., 158°W., shows a clockwise rotation. Highest current speeds in the order of 1 to 2 knots occur again on the periphery of the vortices. In the northern section of the survey region an easterly current turns south between 157° and 158°W. and then flows west just north of the island chain. North of Hawaii a southwesterly current enters the survey region and is deflected to the southeast off the island's coast. The circulation about the island of Hawaii is clockwise.

Geomagnetic Electrokinetograph (GEK) observations

The GEK surface current vectors are plotted in figure 30. The arrows indicate the direction of flow and numbers the speed in cm./sec. All observations were made with unfloated electrodes and subsequently corrected for the "droop" effect.

As before, no detailed analysis is made, but when figures 29 and 30 are compared, agreement between GEK and geostrophic current direction and relative speed is apparent. High GEK speeds occur between the major vortices of figure 29, and the directions there as well as in regions of lower current speed are in good agreement. Interesting to note is the agreement between the GEK currents and the geostrophic current in Kauai Channel. Both figures 29 and 30 show northwesterly flow in the eastern part and southwesterly flow in the western part of the channel.

The agreement of the two methods is general only, and instances such as at stations 19 and 22, where the directions are 90^{o} to 180^{o} out of phase, can be found. The GEK current speeds also appear higher by as much as a factor of 2, as between stations 57 and 58.

Surface temperature, salinity, density and the surface circulation

As before, the surface distribution of variables is of little help in deducing the flow pattern. Only the counterclockwise vortex at station 51 is apparent in figures 26 and 27 from the low temperature and high salinity, respectively. The sigma-t distribution together with the high temperatures west of Hawaii suggest a clockwise circulation about the island. North of Hawaii, figures 27 and 29 show that the tongue of high salinity water is carried into the survey region by the southeasterly setting current.

The lack of agreement between the flow expected from the surface density distribution and that obtained from the dynamic height anomalies again points to the importance of the subsurface distribution of mass.

Subsurface Circulation

The bathymetric chart of the 24.5 sigma-t surface approximately associated with the salinity maximum is shown in figure 31. The isobaths clearly indicate the three vortices in the vicinity of stations 45, 49, and 51. The counterclockwise vortices are identifiable by "doming" and the clockwise vortex by a depression in the sigma-t surface. The resemblance between the isobaths of the 24.5 sigma-t surface and the dynamic height contours at the surface relative to 250 m. (fig. 32), both north and south of the island chain, should be noted. This means that the bathymetric chart of the 24.5 sigma-t surface essentially indicates the relative flow of the intermediate layer, associated with the salinity maximum. This also suggests that the distribution of mass on the salinity maximum layer (sigma-t 24.5) is of greater importance than the surface distribution of mass (fig. 28).

The bathymetric chart of the 26.5 sigma-t surface, approximately at the salinity minimum, is presented in figure 33. Evidence of vortex motion southwest of the island chain is still apparent but less distinct. The location of the counterclockwise vortices is indicated by ridges protruding into the survey region from the southwest, and the clockwise vortex is indicated by a trough extending southward from the Oahu and Molokai region.

The contribution to the surface circulation due to the intermediate flow associated with the salinity minimum is illustrated by the dynamic topography at 250 m. relative to the 500-m. level (fig. 34). It can be seen that the vortices in the vicinity of stations 49 and 51 extend to the depths of the salinity minimum. The vortex at station 45 is, however, obscured by a northeasterly setting current, the direction of which is reversed south of Oahu and in Kaiwi Channel to continue as the westerly setting current south of Kauai. Similar isopleth patterns in figures 33 and 34 again show that the isobaths of the 26.5 sigma-t surface at the salinity minimum give a good indication of flow in this layer. Discrepancies can probably be attributed to the fact that the dynamic height at 250 m. relative to the 500-m. level reflects the distribution of mass only in the upper portion of the flow layer associated with the salinity minimum.

The salinity distribution on the 24.5 and the 26.5 sigma-t surfaces is also indicated by dashed lines in figures 31 and 33 and becomes plausible if studied in conjunction with the dynamic topography at the surface relative to the 500 m. and that at 250 m. relative to the 500-m. level. The usefulness of tracing currents by this method, however, is impaired by the complexity of the system.

A comparison of the dynamic heights presented in figures 29, 32, and 34 shows that the major features in the two intermediate systems are quite similar and generally have an additive effect on the net surface circulatory pattern. The spacing of the contour lines southwest of the island chain is closer in figure 32 than in figure 34, which means that the contribution due to the intermediate system associated with the salinity maximum is of primary importance. Northeast of the island chain the contour line spacing is approximately the same in the two figures, indicating that there the two systems contribute equally.

Differences in the contour line patterns of the two systems (figs. 32 and 34) exist north of the islands of Kauai and Oahu and in the vicinity of station 47. The clockwise circulation about the island of Hawaii is also absent in the deeper flow pattern (fig. 34).

The averaged dynamic height anomalies at 250 m. relative to the 500-m. level in each subdivision of the survey area show a net drift toward the island chain from the northeast which is deflected to the northwest. The same computations for the surface flow relative to the 250-m. level also show a net drift toward the island chain from the northeast, which in this case is deflected toward the southeast. The net motion on the leeward side of the island chain appears negligible in each case. These observations are in agreement with the averaged dynamic heights

at the surface relative to 500 m., where the northwesterly current impinging on the island chain is deflected to the northwest and southeast.

Bathythermograph Data

As before, the bathythermograph data have been included as a record only and are presented by vertical sections in figure 35.

Inorganic Phosphate

On Hugh M. Smith cruise 21 good, reproducible inorganic phosphate data, analyzed aboard ship by the method described by Wooster and Rakestraw (1951), were obtained. The surface values were plotted on figure 36 and show little variation. The average phosphate-phosphorus concentration on the windward side of the island chain was approximately 0.2 μg-at/l and on the leeward side 0.3 μg-at/l. A tongue of low-phosphate water (less than 0.2 μg-at/l) reached into the survey region between stations 5 and 9 and extended toward the island of Hawaii. This is in good agreement with the surface currents as shown in figure 29. A tongue with a high phosphate concentration (greater than 0.4 μg-at/l) appears between stations 58 and 60 and extends to station 39, between the counterclockwise and clockwise vortices centered in the vicinity of stations 51 and 49 (fig. 29).

Figure 37 shows the phosphate distribution on the 24.5 sigma-t surface. In general the average concentration is lower on the windward side (0.2 μg-at/l) than on the leeward side (0.3 μg-at/l). Interesting to note is the similarity of the isopleth structure of phosphate-phosphorus and salinity (fig. 31) on the windward side of the island chain. On the leeward side, the outstanding feature is the pocket of low-phosphate water (less than 0.2 μg-at/l) in a region where the average concentration is greater than 0.3 μg-at/l. This pocket is located in the vicinity of station 39, to the northeast of the clockwise vortex (fig. 29), within a tongue of lower phosphate water extending southward through Kaiwi Channel.

The phosphate distribution on the 26.5 sigma-t surface is shown in figure 38, where again the concentration is lower on the windward side (generally less than 2 μg-at/l) than on the leeward side (generally greater than 2 μg-at/l). A tongue of lower phosphate water reaches southward through Kauai Channel toward station 49, and another through Alenuihaha Channel to station 38. Again there are similarities in the isopleth structure of the phosphate and salinity concentration (fig. 33) on the 26.5 sigma-t surface.

Summary of Cruise

Cruise 21 of the Hugh M. Smith took place during summer conditions, with typical trade wind weather prevailing. The systems identified by the salinity minimum, the salinity maximum, and the surface waters were again investigated separately. It was shown that the surface current pattern southwest of the island chain was primarily influenced by the system associated with the salinity maximum (fig. 32, which in its computation includes the surface distribution of mass). Northeast of the island chain the dynamic computation showed that the lower intermediate system and the upper intermediate system together with the surface system were of approximately equal importance.

There was little or no net transport of water through the survey region on the leeward side in either of the intermediate systems. On the windward side water was renewed from the north or northeast and then deflected both to the northwest and southeast. The northwest deflection was primarily due to the flow associated with the salinity minimum.

GEK observations showed general agreement with currents obtained from dynamic computations. This might be expected when one considers that the system during the summer becomes less complex and that therefore the instantaneous GEK observations are in closer agreement with average current conditions.

Inorganic phosphate observations showed that the surface concentration on the leeward side of the island chain was greater than on the windward side, although the difference was small. This suggests, as was shown by dynamic computations, that on the windward side there exists a continuous influx of new, low-phosphate water. On the leeward side, the stationary surface waters may be enriched by vertical mixing or island drainage.

DISCUSSION

The purpose of this report has been the presentation of data which were collected on cruises 17, 20, and 21 of the Hugh M. Smith. Two of these occurred during the summer months of August and September and one during the winter months of February and March.

The data for each cruise were examined separately, first the surface and then the subsurface layers. Important and interesting

features were pointed out, but in general no attempt has been made to interpret or explain them. It is felt that the information gained from each cruise is but a fragment of the oceanographic picture of the Hawaiian Islands region and a more complete understanding must wait until all the available data can be synthesized.

Surface Variables

The surface layer has been given special attention because in it the primary production of the sea takes place. The surface parameters of temperature, salinity, and density can also be used as indices of seasonal and longer period changes in the oceanic environment.

An understanding of the surface temperature is particularly useful because of the easy manner in which it can be measured by thermometer and bathythermograph. Generally temperature is the important independent variable in the density distribution, which in turn is used to obtain the relative current picture. In the Hawaiian Islands region, however, it was shown that salinity is also important in the distribution of surface density.

Table 5 below summarizes for each cruise the averaged surface temperature, salinity, and density (sigma-t) in the four sections of the survey region. On the basis of data from one winter and two summer cruises, one can only hint at the seasonal trends and point to interesting features. By studying the temperature, for example, one finds that the seasonal range is about 4°F., which is less than the extreme range of almost 6°F. encountered during cruise 17. The extreme ranges on the windward and leeward sides of the island chain on cruises 20 and 21 did not indicate any clear seasonal trend. The leeward side of the island chain was dominated during cruise 17 by a large counterclockwise vortex, whereas during cruises 20 and 21 there were a number of smaller vortices in this region. Thus, the temperature range might indicate the type of vortex activity.

Although the average salinities changed from cruise to cruise, no seasonal trend is indicated. Figures of the surface salinity distribution suggest that the changes are not due to island runoff only, but also to varying concentrations outside the survey region.

It is interesting to note that the salinity range in each cruise shows a seasonal trend. On cruise 17 (summer) the extreme range was about $0.3^{\circ}/oo$, on cruise 20 (winter) $0.9^{\circ}/oo$, and on cruise 21 (summer) $0.5^{\circ}/oo$. Another interesting feature is the slightly

Table 5.--Average surface temperatures, salinities, and densities for H. M. Smith cruises 17, 20, and 21

	Overall survey region	Northeast of island chain				Southwest of island chain			
		East	West	Overall	Extremes	East	West	Overall	Extremes
Temp. (°F.)									
Cruise 17 (Sept.)	78.0	77.6	77.5	77.6	79.0 77.0	78.0	79.2	78.6	80.5 74.8
Cruise 20 (March)	74.3	73.5	73.5	73.5	74.3 71.8	74.8	74.9	74.9	76.3 73.4
Cruise 21 (August)	78.0	76.9	77.2	77.0	77.7 76.3	78.3	79.0	78.6	79.5 76.6
Salinity (°/oo)									
Cruise 17 (Sept.)	35.12	35.18	35.15	35.15	35.33 35.05	35.08	35.05	35.06	35.28 34.95
Cruise 20 (March)	35.00	35.06	35.18	35.11	35.34 34.45	34.75	35.08	34.91	35.33 34.42
Cruise 21 (August)	34.99	35.06	34.99	35.02	35.27 34.79	34.92	35.02	34.97	35.11 34.82
Density (σ_t)									
Cruise 17 (Sept.)	23.25	23.37	23.34	23.36	23.58 23.04	23.23	23.05	23.14	23.67 22.80
Cruise 20 (March)	23.76	23.93	24.05	23.98	24.35 23.34	23.49	23.74	23.61	24.15 23.27
Cruise 21 (August)	23.18	23.43	23.32	23.37	23.52 23.21	23.10	23.02	23.07	23.47 22.92

increasing trend of salinity from west to east during cruise 17, and a more definite increasing trend from east to west during cruise 20 on both sides of the island chain. During cruise 21 the salinity increased from west to east on the windward side and from east to west on the leeward side of the island chain.

Variations in the average surface sigma-t values show the combined effects of the temperature and salinity variations. The sigma-t values are higher in winter than in summer and for each cruise they are also higher on the windward side of the islands, reflecting the temperature effect. The greater range in extreme values of sigma-t for the winter cruise than for the summer cruises reflects the influence of salinity on the density.

It is interesting to note that the sigma-t values increased from southwest to northeast during the summer cruises and from south to north during the winter cruise. Thus, the relative current due to the surface distribution of mass would drift southeastward in summer and eastward in winter.

Surface Currents

The investigation of surface variables was followed by a study of the surface current pattern, which generally was one of complexity with little net transport through the survey region.

The dynamic topography (fig. 5) of cruise 17 showed that the leeward region was dominated by a large counterclockwise vortex. The currents on the windward side appeared to be very weak, except for one in the region north of Kauai setting southwest at approximately 0.4 knots.

The dynamic topography of cruise 21 (fig. 29). showed two counterclockwise vortices in the lee of the island chain. The position of the counterclockwise vortex of cruise 17 was now occupied by a large clockwise vortex. The current pattern on the windward side of the island chain also appeared more complex than on cruise 17.

The most confusing current pattern was shown by the dynamic topography of cruise 20 (fig. 15), when both sides of the island chain were dominated by vortex motion apparently without a systematic pattern.

Subsurface Circulation

The currents deduced from the surface density (the light water is to the right of an observer facing in the current direction) were not

always in agreement with those obtained from surface dynamic heights. This emphasized the importance of the subsurface distribution of mass. The survey data indicate three major systems within the POFI sampling depths: the system associated with the surface distribution of mass, that associated with the salinity maximum, and that associated with the salinity minimum.

The 24.5 and 26.5 sigma-t surfaces were generally associated with the salinity maximum and the salinity minimum, respectively. Their isobaths would give an indication of the direction of flow at these levels. Conventional isentropic analysis, however, such as plotting the variation of a tracer, like salinity, on surfaces of potential density (sigma-t) was not successful in the Hawaiian Islands region.

The relative importance of the systems associated with the salinity maximum and minimum was further investigated by means of dynamic height anomalies in these layers. The reference levels were the maximum sampling depths (600 m. for cruise 17, 1,000 m. for cruise 20, and 500 m. for cruise 21) and the approximate depth of the inflection point between the salinity maximum and the salinity minimum on the temperature-salinity diagram (fig. 32). Thus for cruise 17 the contribution to the net surface flow due to the system associated with the salinity minimum would be represented by the dynamic height anomalies at 300 m. relative to the 600-m. level. The contribution to the net surface flow due to the upper layer, associated with the salinity maximum and the surface distribution of mass, would be represented by the dynamic height anomalies at the surface relative to 300 m. The latter gives the current directions and magnitudes relative to the currents at 300 m. (The concept of relative motion is familiar to navigators, for because of current motion the actual path of a vessel may be quite different from either the course steered or the current direction.) This presentation shows the relative importance of the distribution of mass associated with two subsurface flow systems, the upper of which would include the effect due to the surface distribution of mass.

The dynamic topographies of the intermediate water masses associated with the salinity minimum of the three cruises were shown in figures 8, 21, and 34. In each case any net flow through the survey region is obscured, except in figure 8 of cruise 17, where the westerly flow is clearly in evidence. Qualitatively, the averaged dynamic heights for cruises 20 and 21 show a southwesterly setting drift passing through the survey region. Differences between the averaged dynamic heights in the quadrants of the survey region for each cruise indicate that the strength of currents during the summer months (cruises 17 and 21) is approximately twice that observed during the winter cruise.

Figures 9, 20, and 32 showed the relative flows of the upper intermediate layer associated with the salinity maximum. In each case the complex pattern obscured any net current trend. Qualitatively, the averaged dynamic heights indicate that during cruise 17 a weak, southwesterly current passed through the survey region with some of the water being deflected toward the northwest and southeast along the island chain. For cruise 20 a southeasterly drift was indicated along the island chain, and for cruise 21 the averaged dynamic heights showed a southerly current impinging on the islands which was deflected toward the southeast. The net current strength during cruises 20 and 21 was approximately twice that of cruise 17, but in cruise 21 the direction changed toward that observed for cruise 17. The indicated seasonal variation in the relative drift direction of the upper intermediate layer was a feature also noted in the surface layer.

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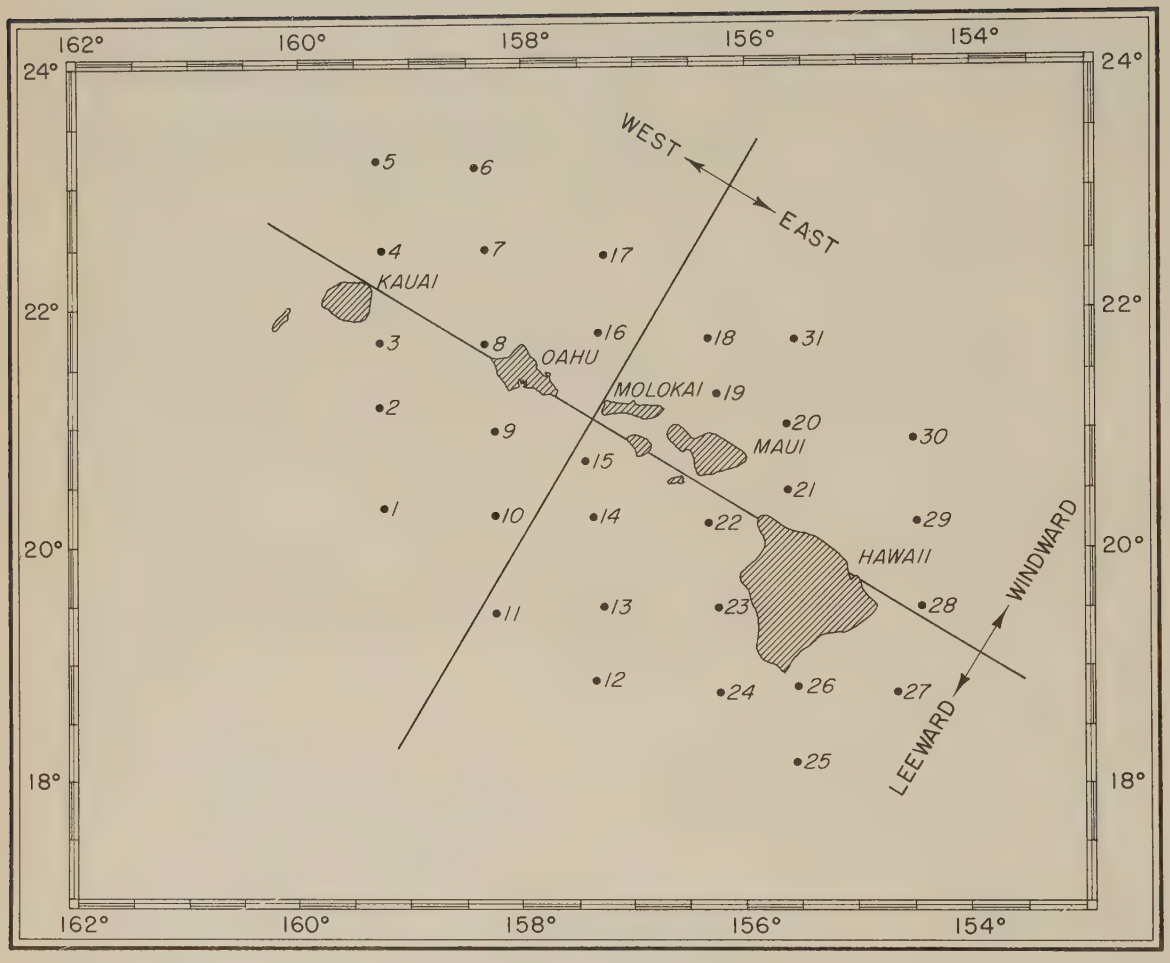

Figure 1.--Station positions, H. M. Smith cruise 17, September 1952. The straight lines indicate the subdivision of the survey region into quadrants.

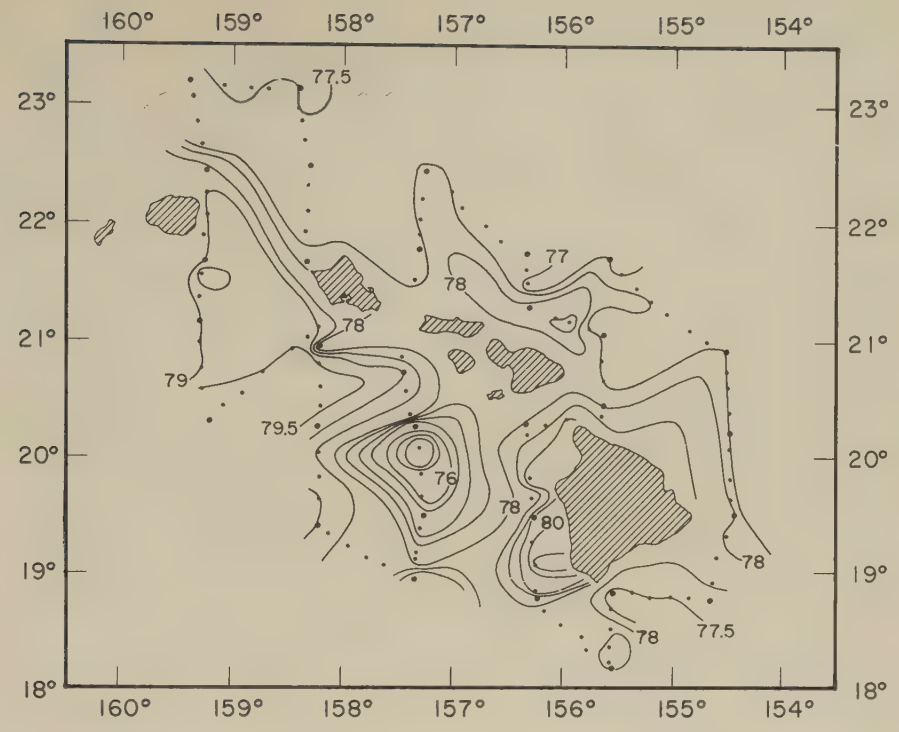

Figure 2.--Surface bucket temperatures in °F., with contour intervals of 0.5°F. H. M. Smith cruise 17, September 1952.

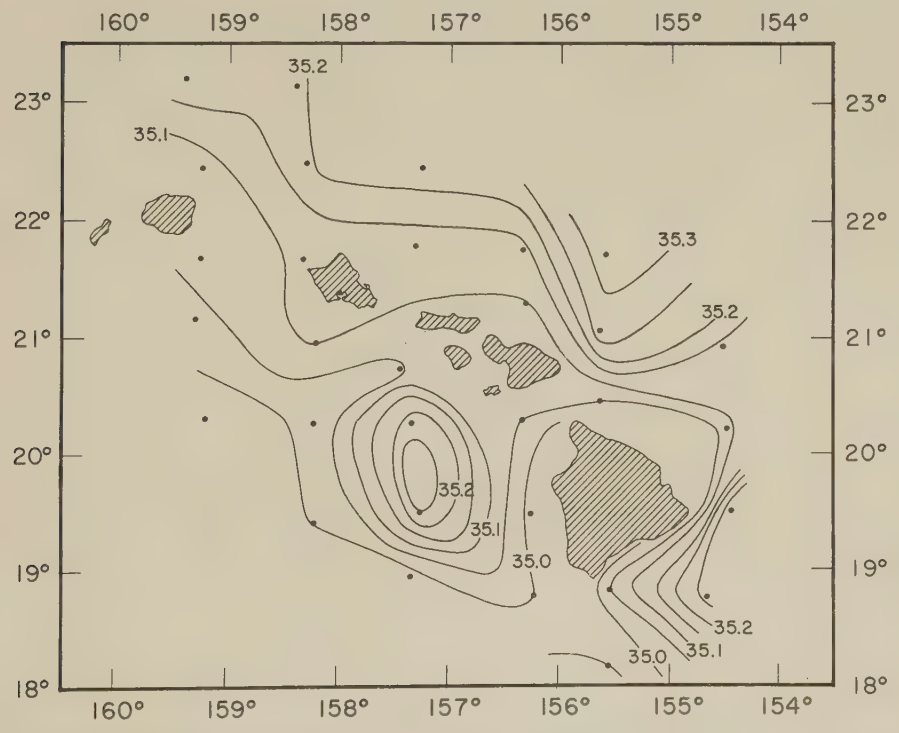

Figure 3.--Surface salinity in °/oo, H. M. Smith cruise 17, September 1952. Contour interval 0.05 °/oo.

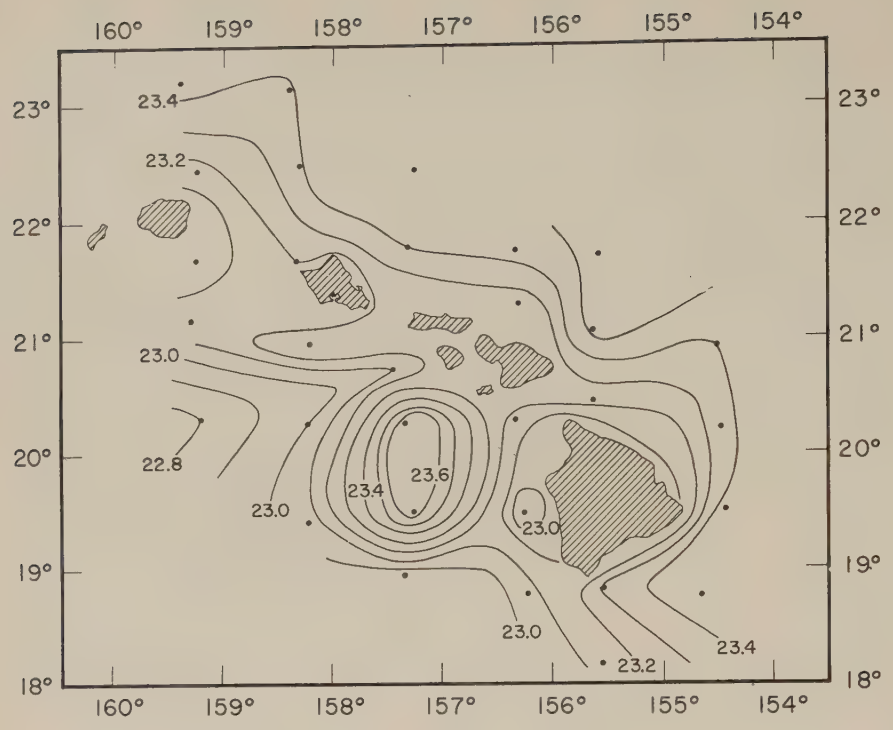

Figure 4.--Surface density (sigma-t), H. M. Smith cruise 17, September 1952. Contour interval 0.1.

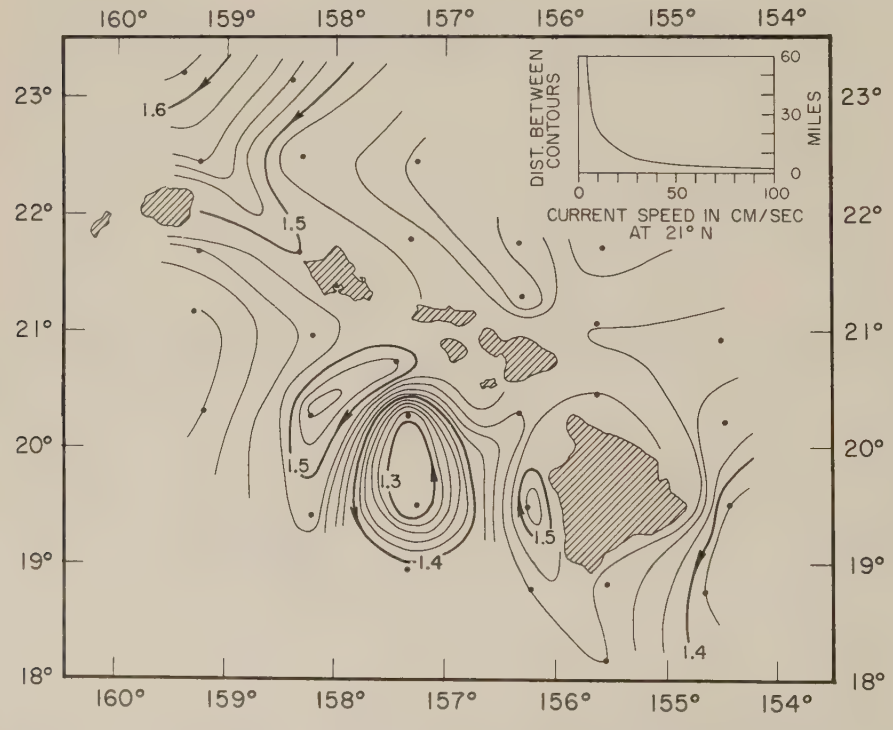

Figure 5.--Dynamic height anomalies (dynamic meters) at the surface relative to 600 m., H. M. Smith cruise 17, September 1952. Contour interval 0.02 dynamic meters.

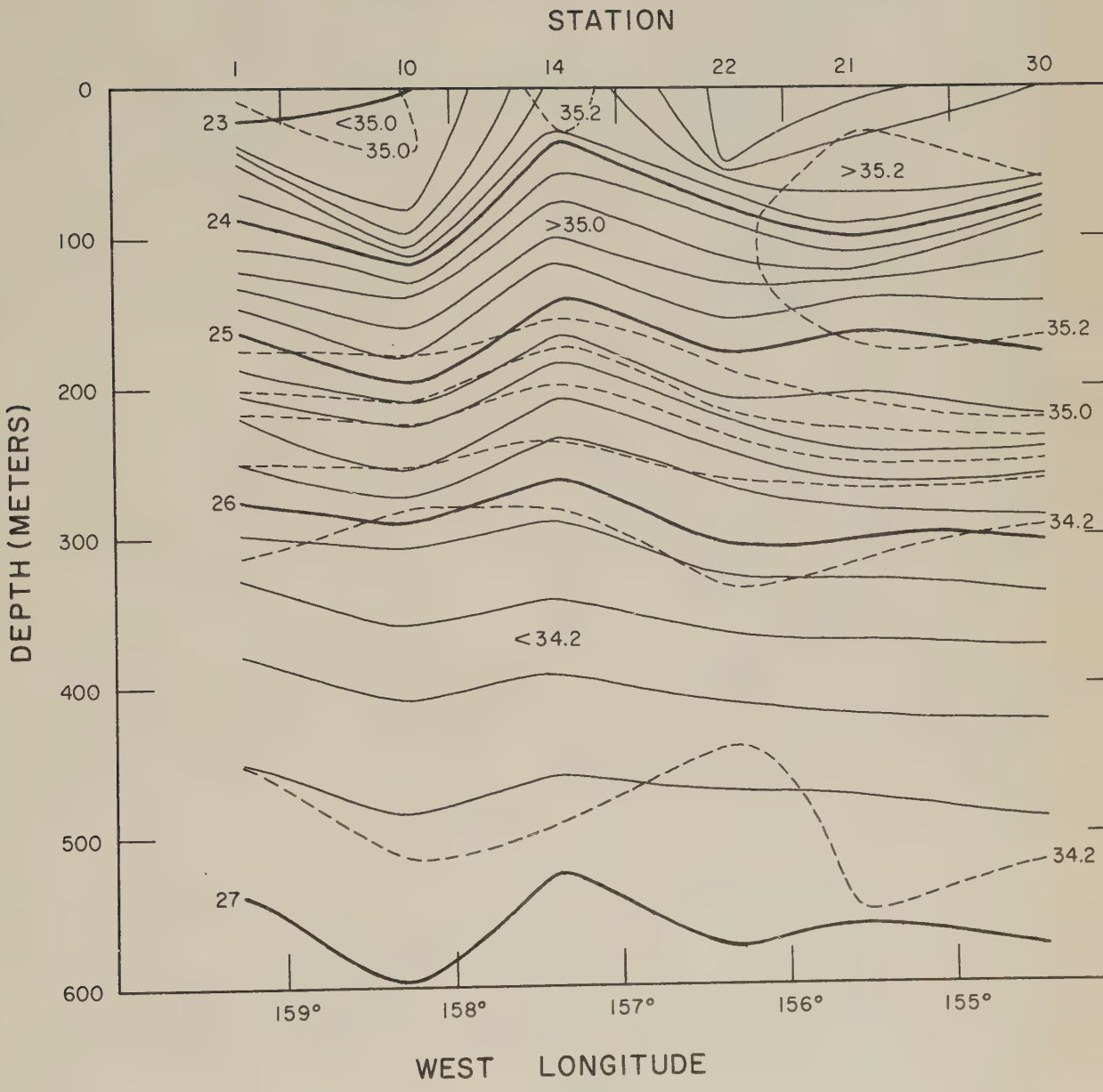

Figure 6.--Density (sigma-t) section (solid lines) and salinity (^{o}/oo) section (dashed lines) through stations 1, 10, 14, 22, 21, and 30, H. M. Smith cruise 17, September 1952. Sigma-t contour interval is 0.2, salinity contour interval 0.2 ^{o}/oo.

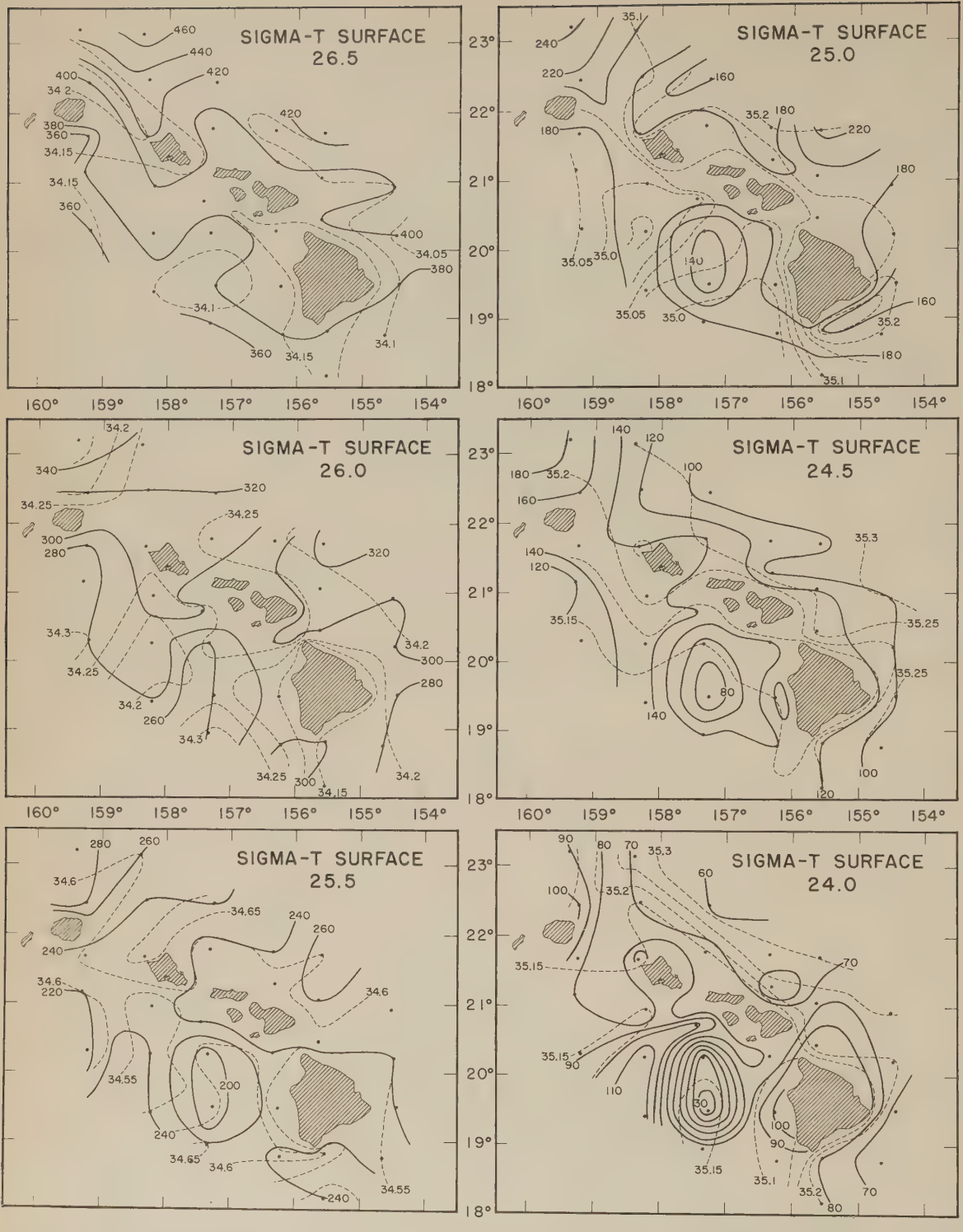

Figure 7.--Bathymetric chart (depth in meters) of the 26.5, 26.0, 25.5, 25.0, 24.5, and 24.0 sigma-t surfaces, H. M. Smith cruise 17, September 1952. Contour interval 20 m. Dashed lines indicate the salinity (^{o}/oo) distribution on these surfaces with contour intervals of 0.5 ^{o}/oo.

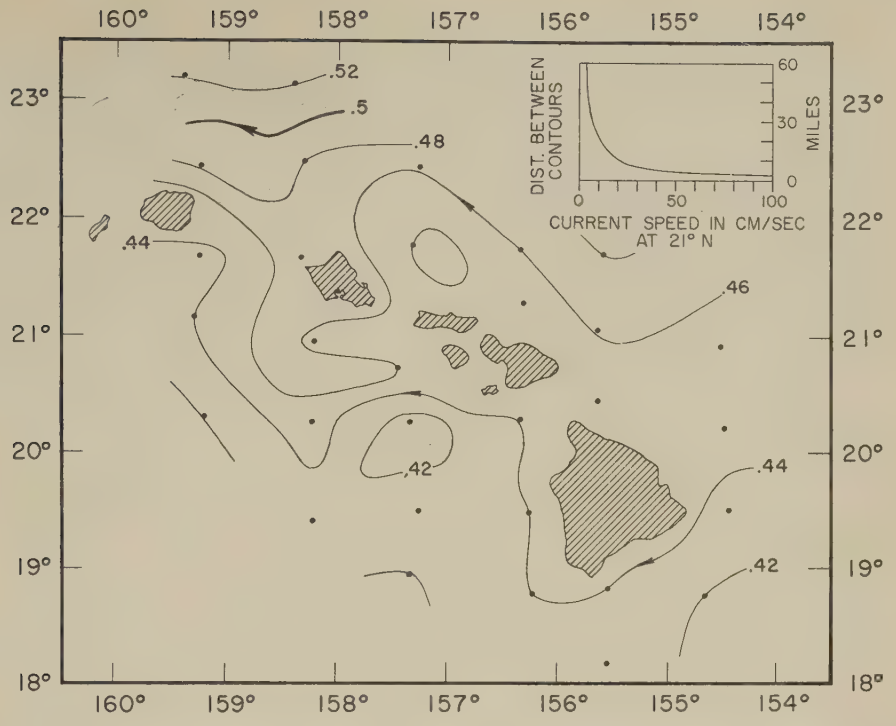

Figure 8.--Dynamic height anomalies (dynamic meters) at 300 m. relative to 600 m., H. M. Smith cruise 17, September 1952. Contour interval 0.02 dynamic meters.

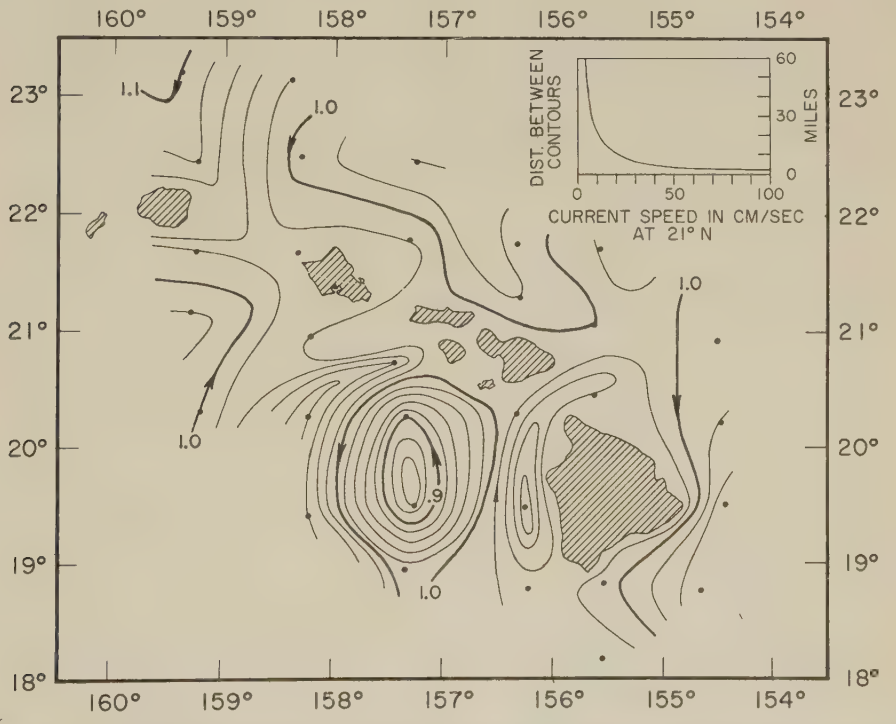

Figure 9.--Dynamic height anomalies (dynamic meters) at the surface relative to 300 m., H. M. Smith cruise 17, September 1952. Contour interval 0.02 dynamic meters.

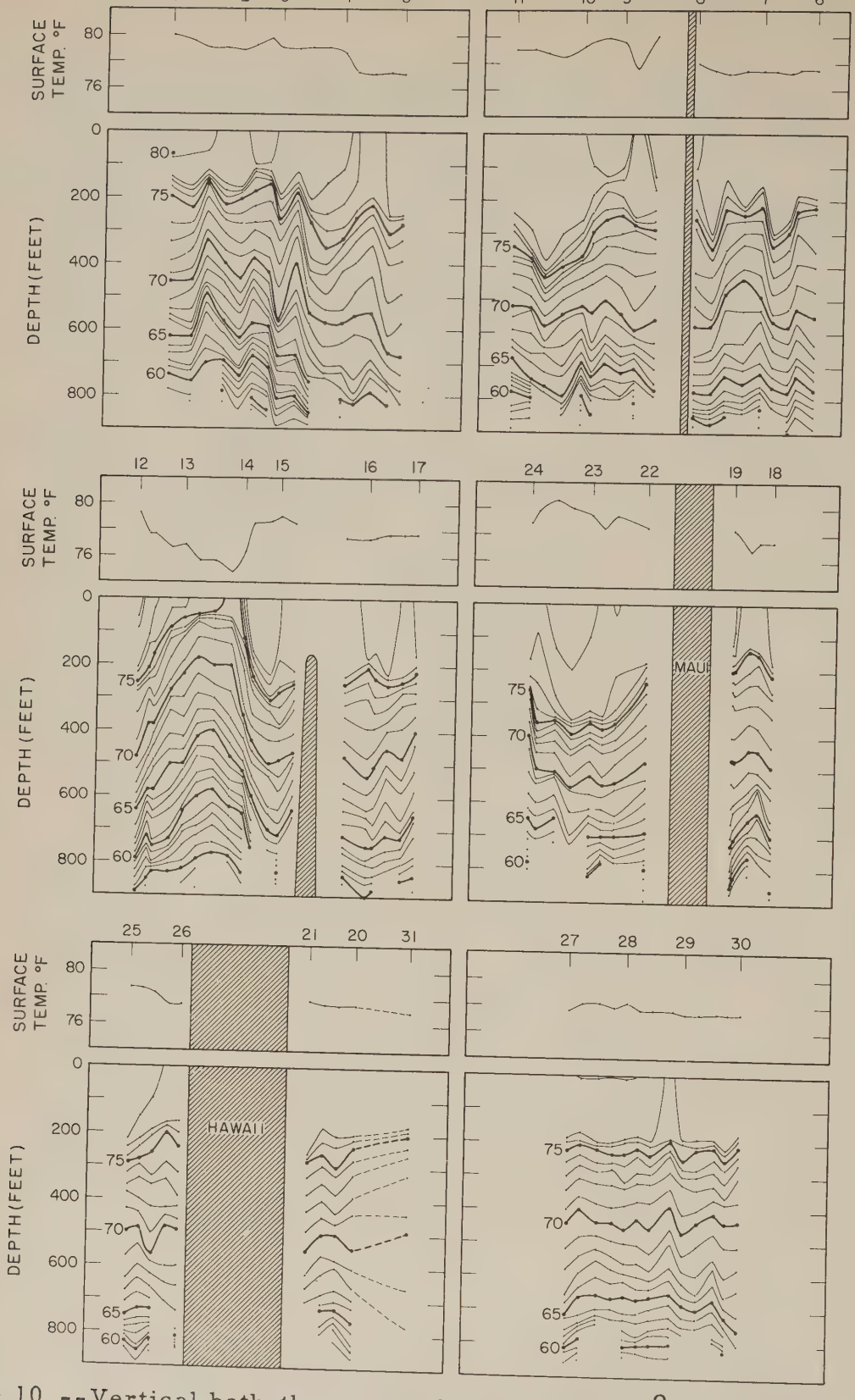

Figure 10.--Vertical bathythermograph temperature (°F.) sections from stations 5 to 1, 6 to 11, 17 to 12, 18 to 24, 31 to 25, and 30 to 27, H. M. Smith cruise 17, September 1952. The upper panels show the surface bucket temperatures in °F.

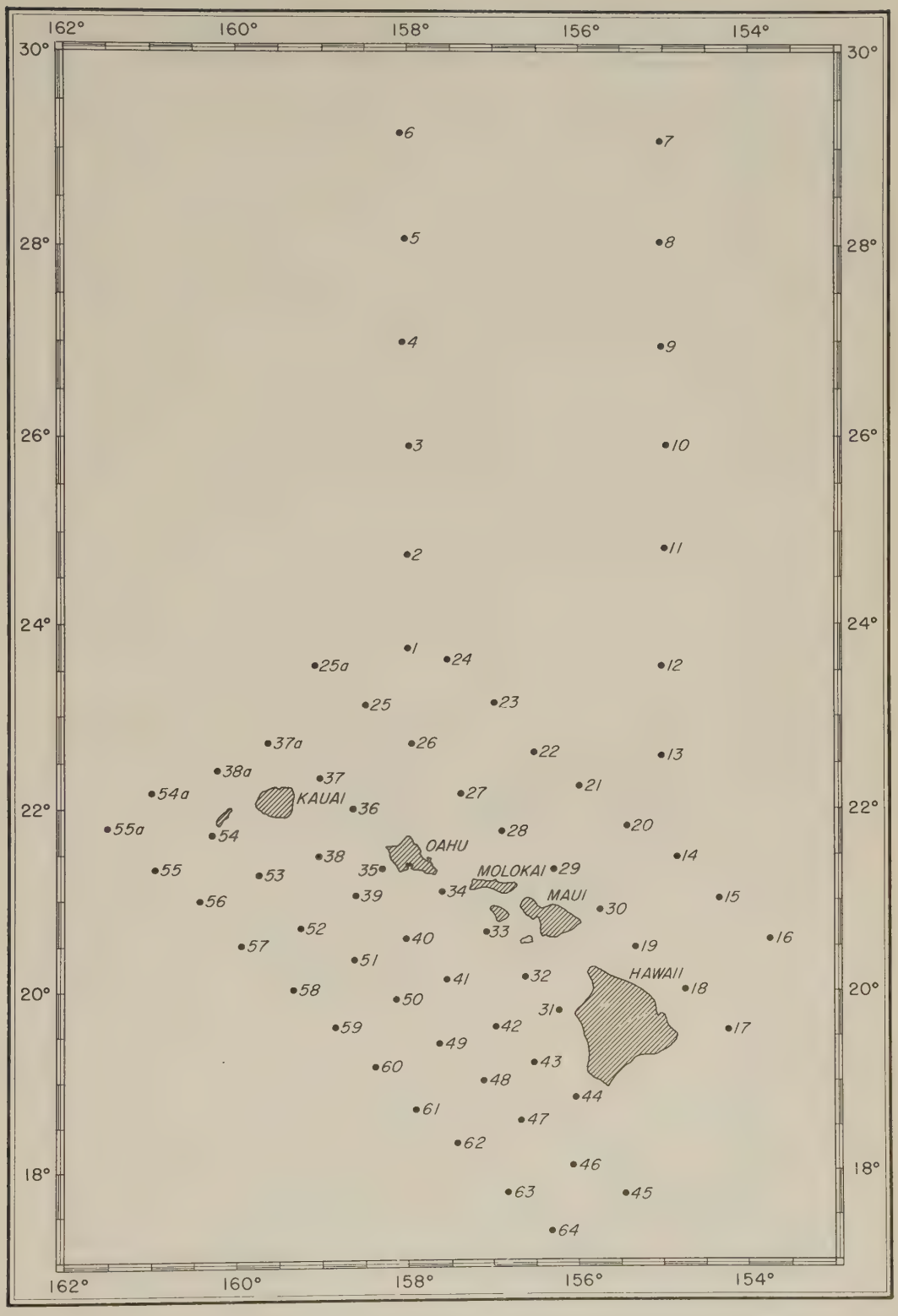

Figure 11.--Station positions, H. M. Smith cruise 20, March 1953.

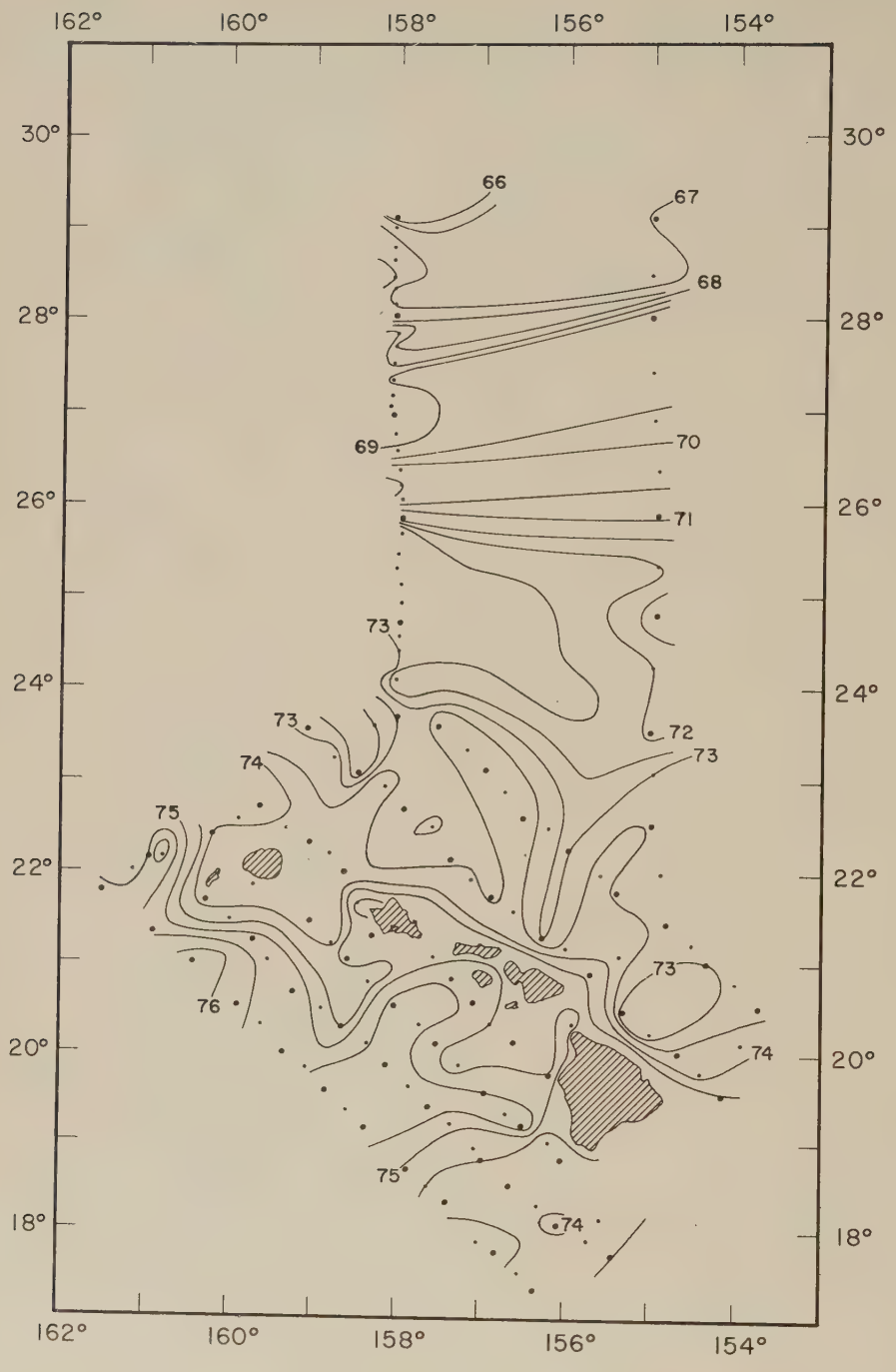

Figure 12.--Surface bucket temperatures in ^{o}F., with contour intervals of 0.5^{o}F. H. M. Smith cruise 20, March 1953.

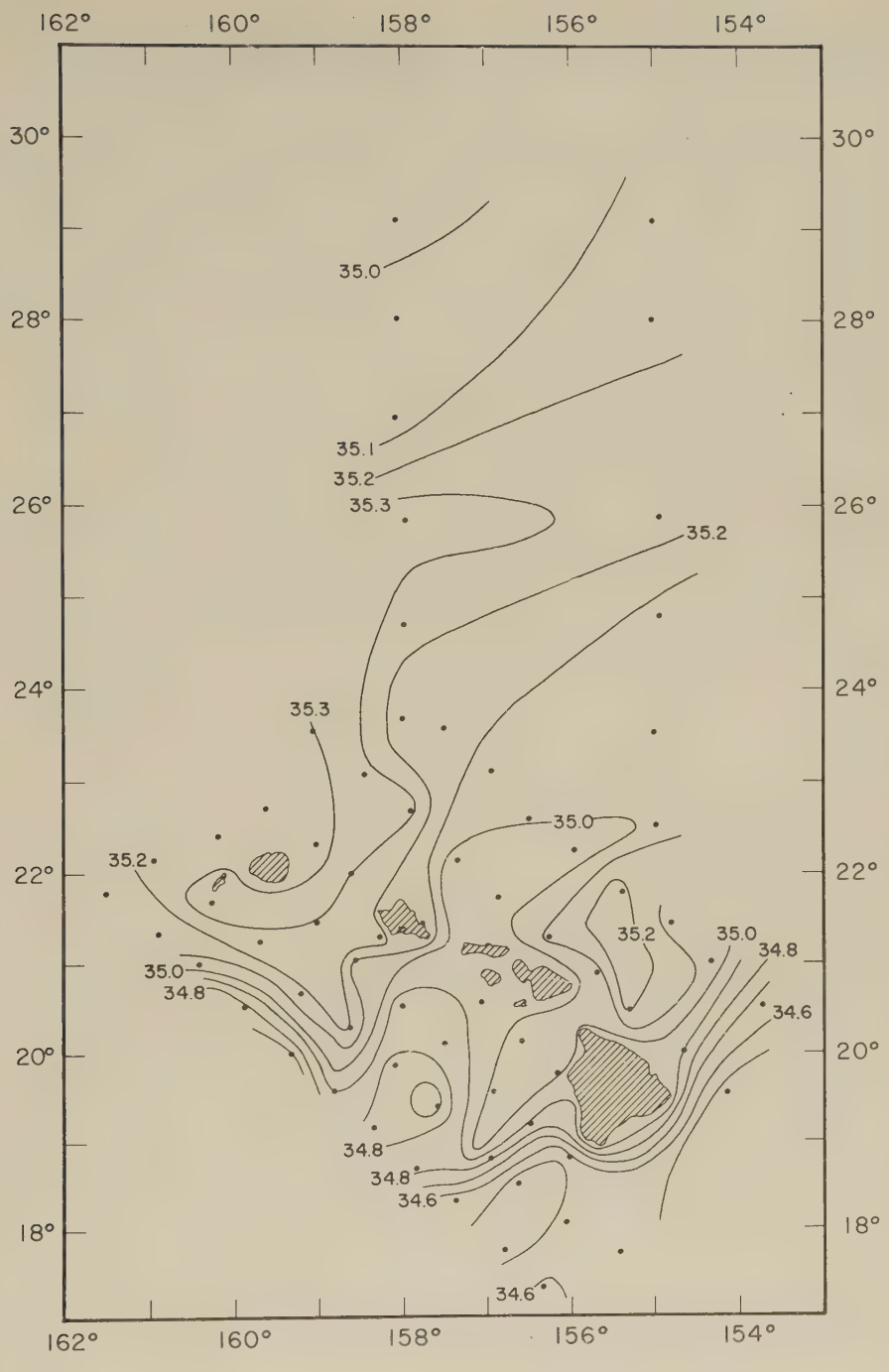

Figure 13.--Surface salinity in °/oo, H. M. Smith cruise 20, March 1953. Contour interval 0.1 °/oo.

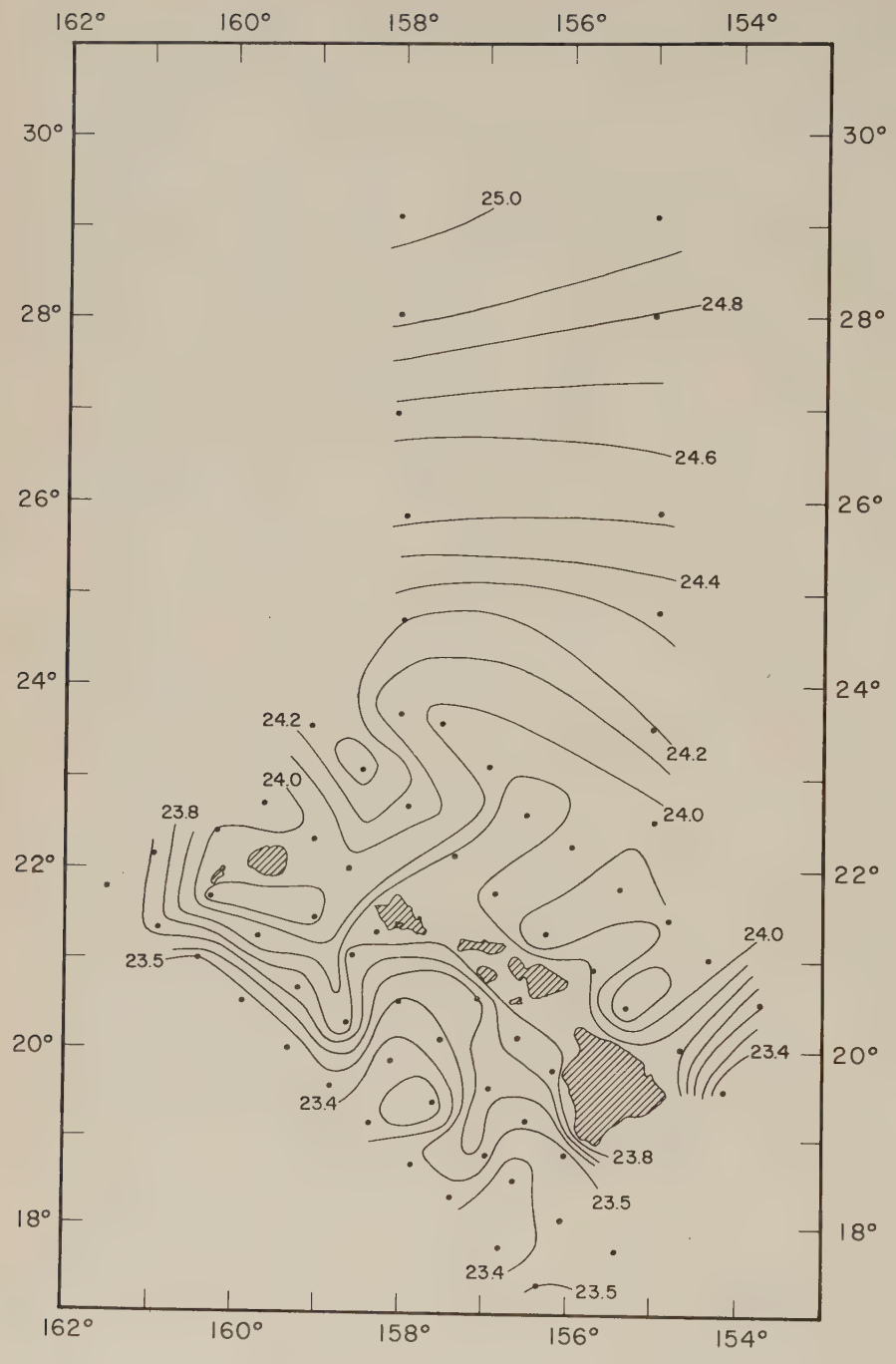

Figure 14.--Surface density (sigma-t), H. M. Smith cruise 20, March 1953. Contour interval 0.1.

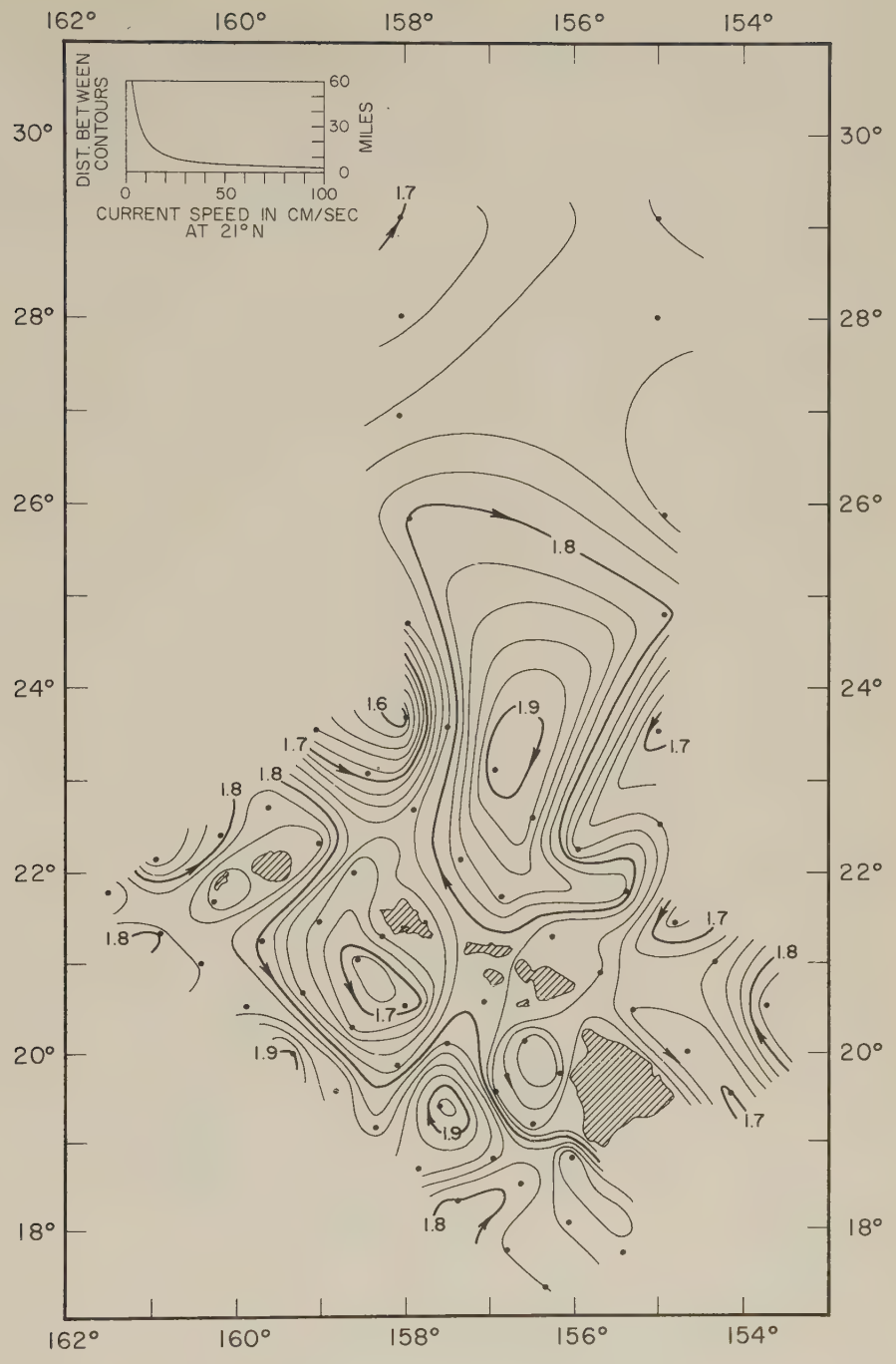

Figure 15.--Dynamic height anomalies (dynamic meters) at the surface relative to 1,000 m., H. M. Smith cruise 20, March 1953. Contour interval 0.02 dynamic meters.

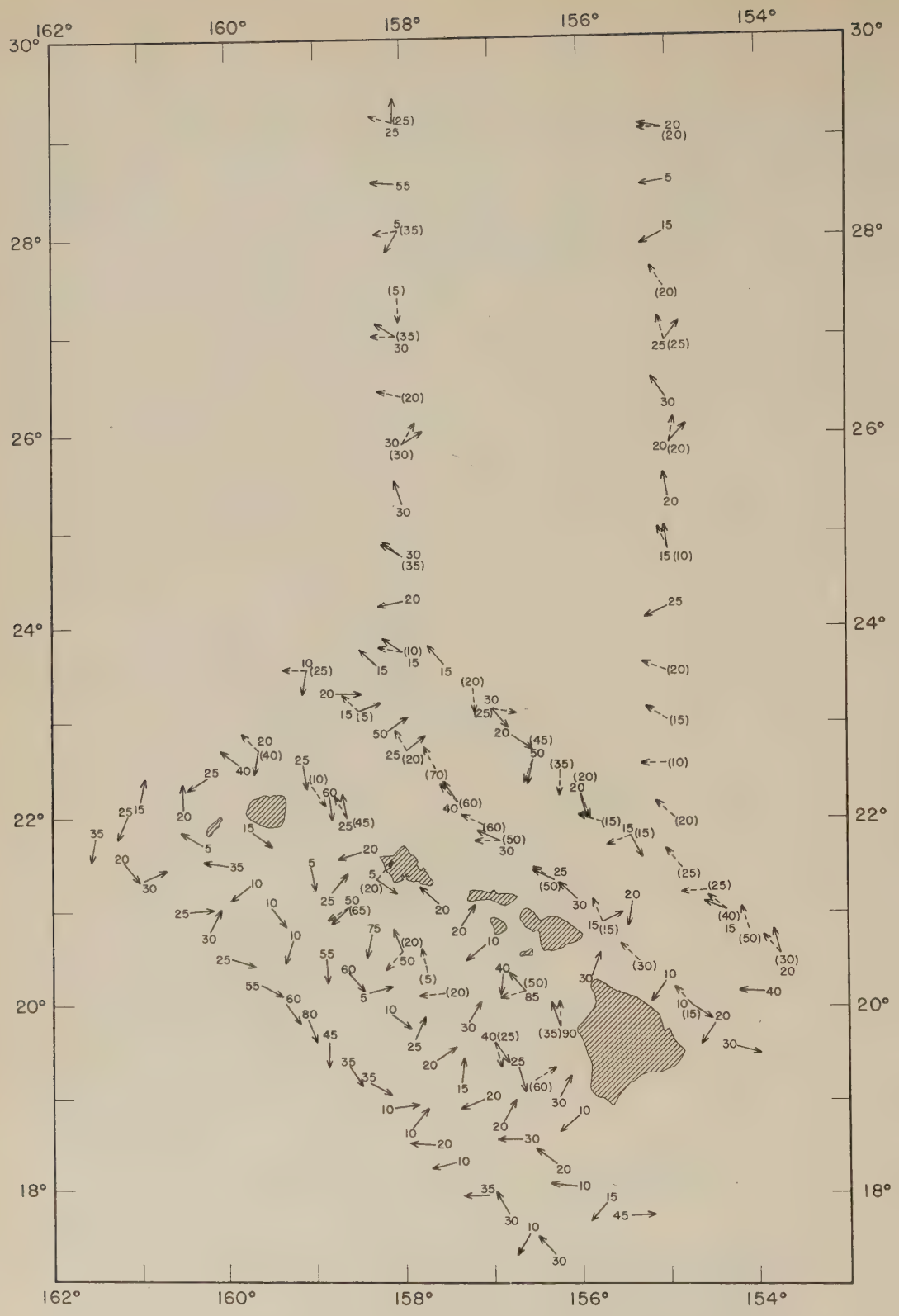

Figure 16.--Geomagnetic electrokinetograph (GEK) current speeds in cm./sec. and directions, H. M. Smith cruise 20, March 1953. Dashed arrows and numbers in parentheses indicate observations with floated electrodes.

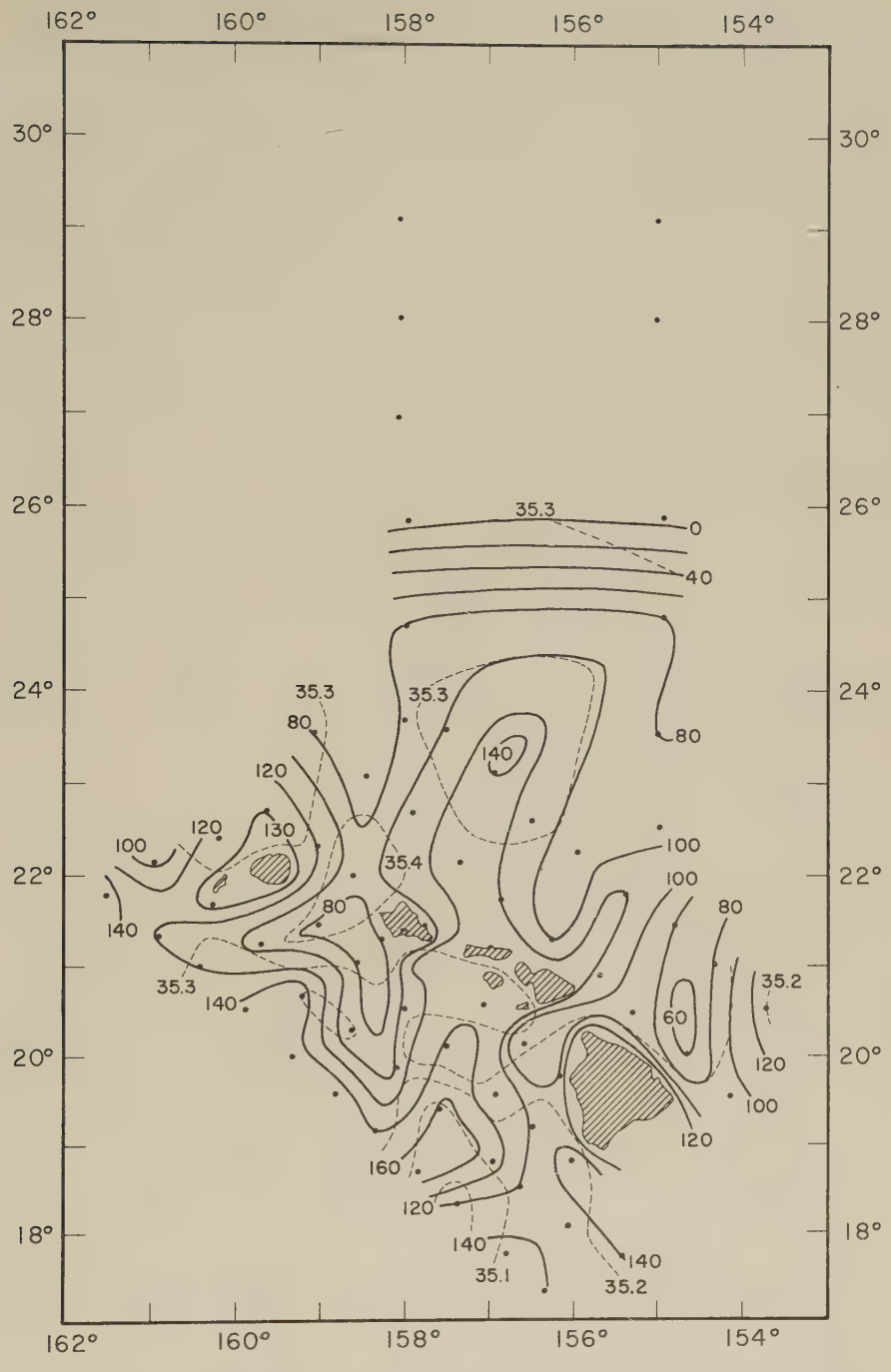

Figure 17.--Bathymetric chart (depth in meters) of the 24.5 sigma-t surface, H. M. Smith cruise 20, March 1953. Contour interval 20 m. Dashed lines indicate the salinity (^{o}/oo) distribution on the surface with contour intervals of 0.1 ^{o}/oo.

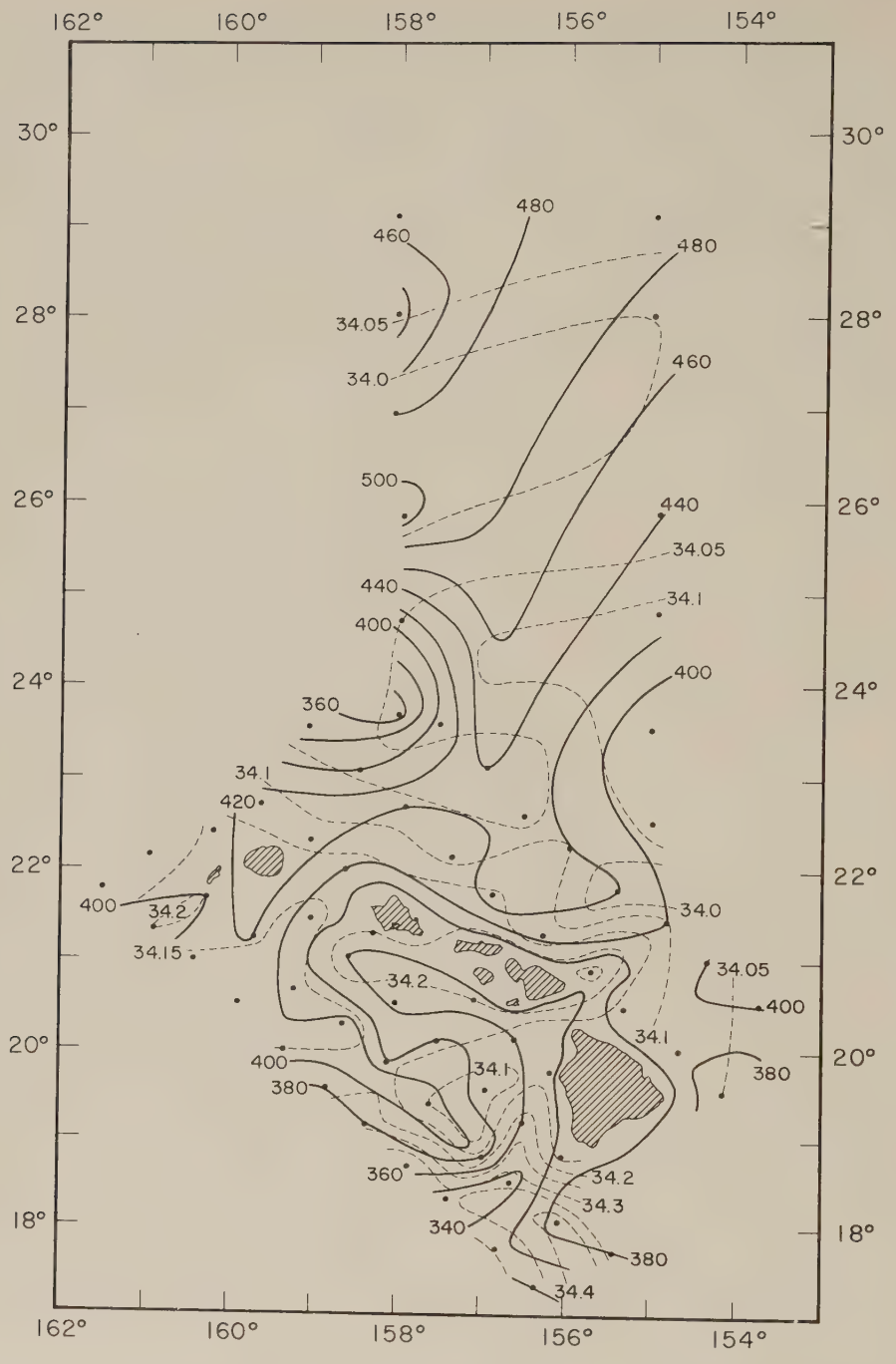

Figure 18.--Bathymetric chart (depth in meters) of the 26.5 sigma-t surface, H. M. Smith cruise 20, March 1953. Contour interval 20 m. Dashed lines indicate the salinity (^{o}/oo) distribution on the surface with contour intervals of 0.05 ^{o}/oo.

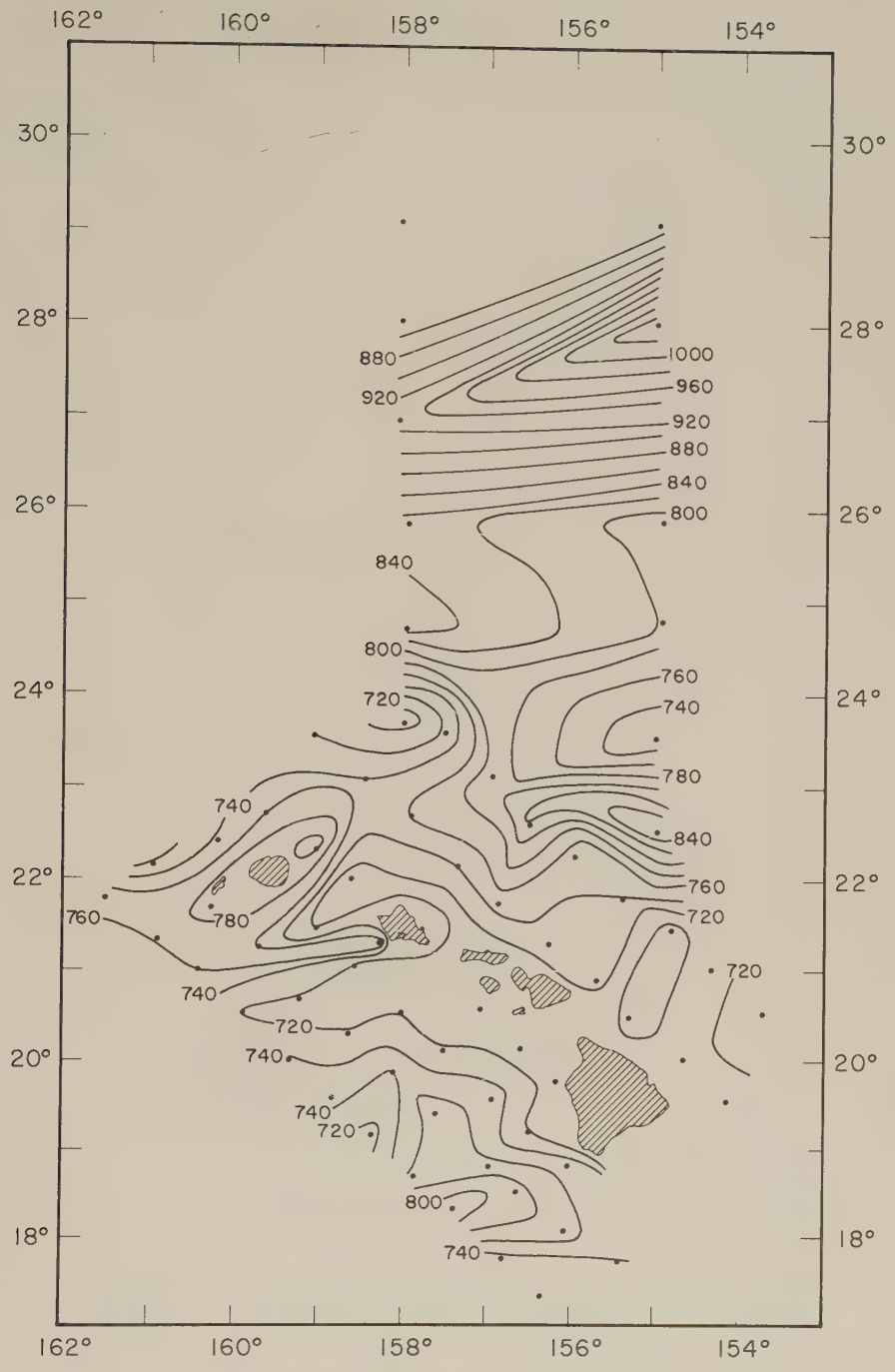

Figure 19.--Bathymetric chart (depth in meters) of the 27.2 sigma-t surface, H. M. Smith cruise 20, March 1953. Contour interval 20 m.

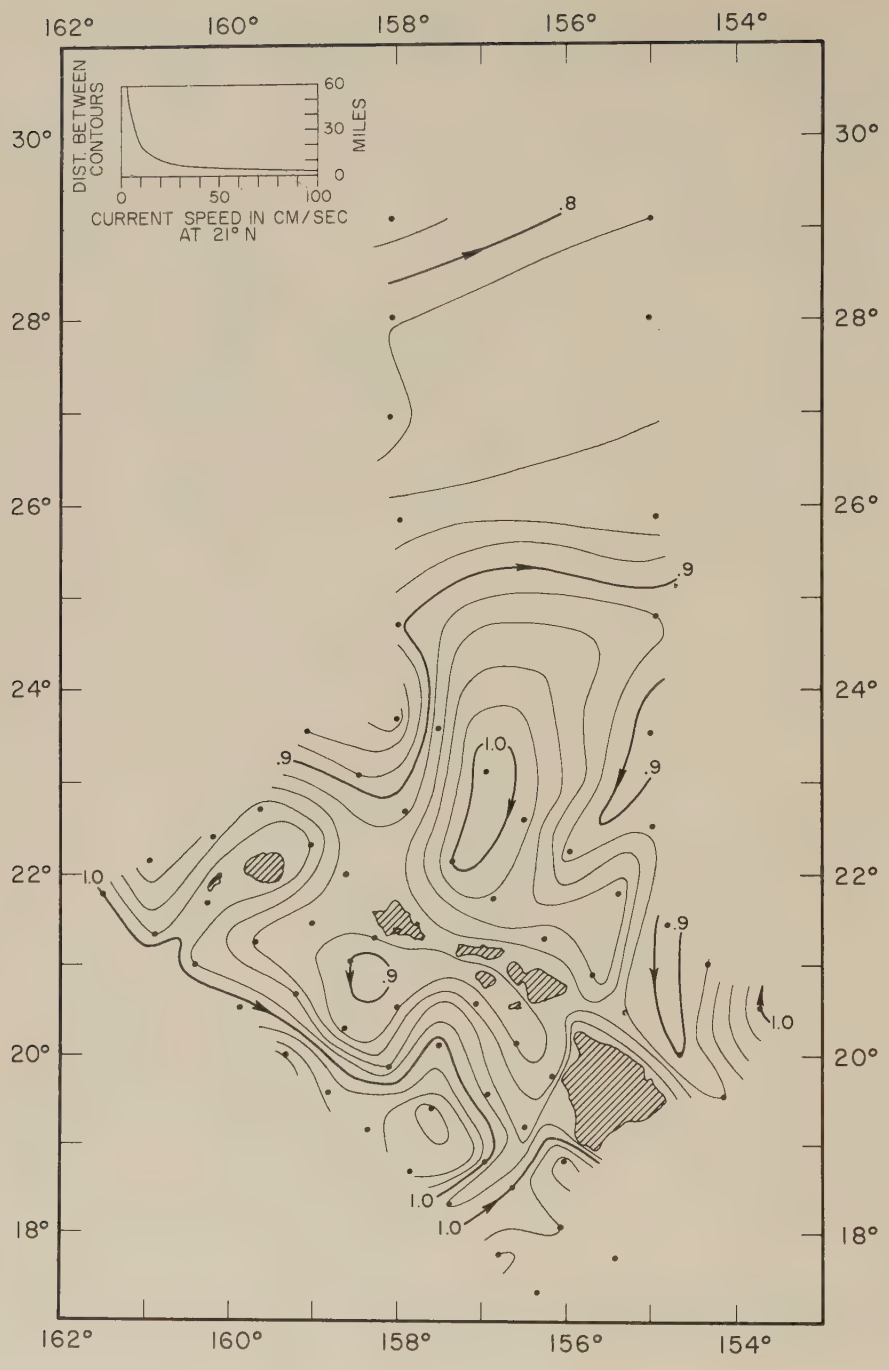

Figure 20.--Dynamic height anomalies (dynamic meters) at the surface relative to 300 m., H. M. Smith cruise 20, March 1953. Contour interval 0.02 dynamic meters.

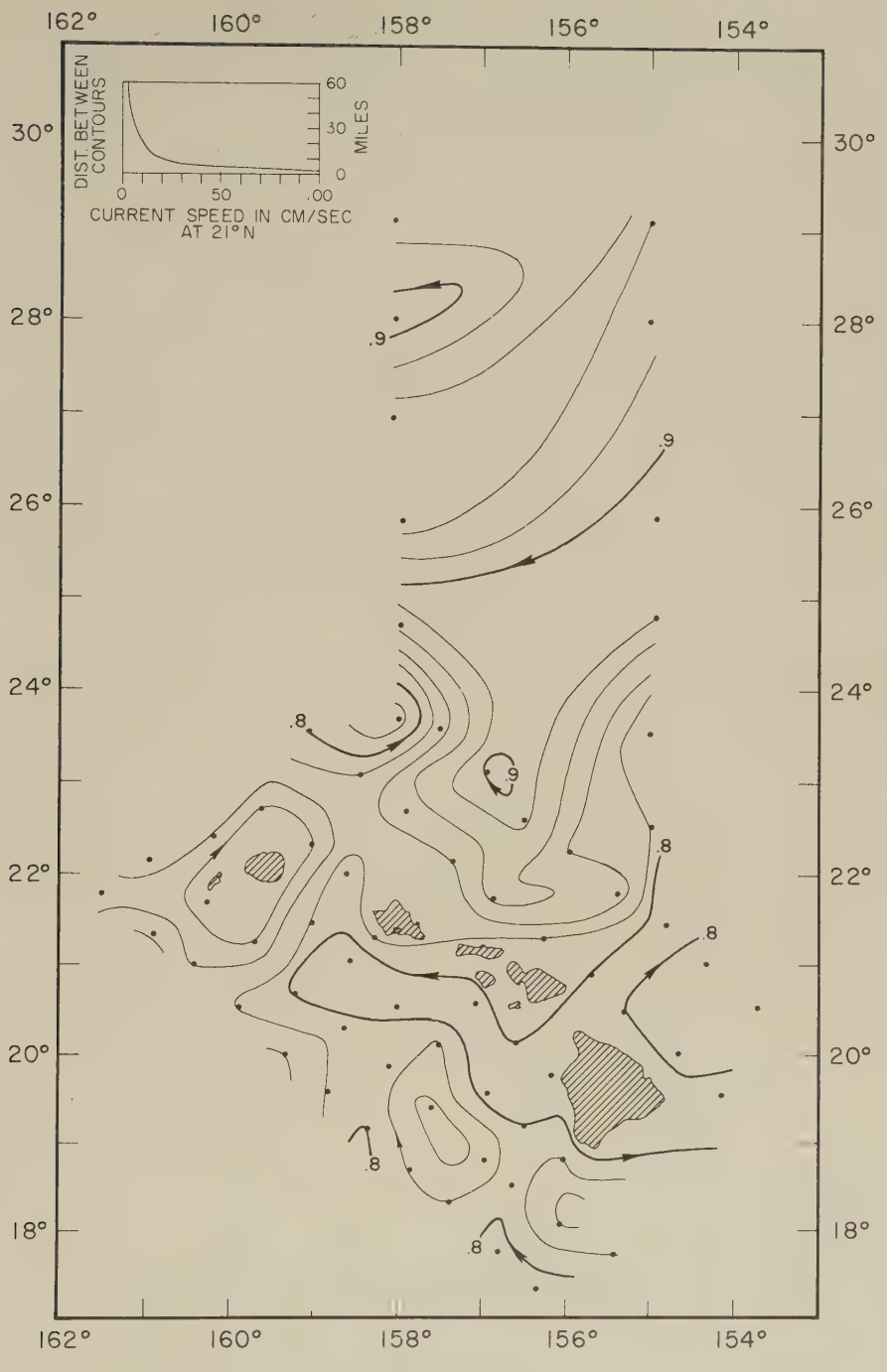

Figure 21.--Dynamic height anomalies (dynamic meters) at 300 m. relative to 1,000 m., H. M. Smith cruise 20, March 1953. Contour interval 0.02 dynamic meters.

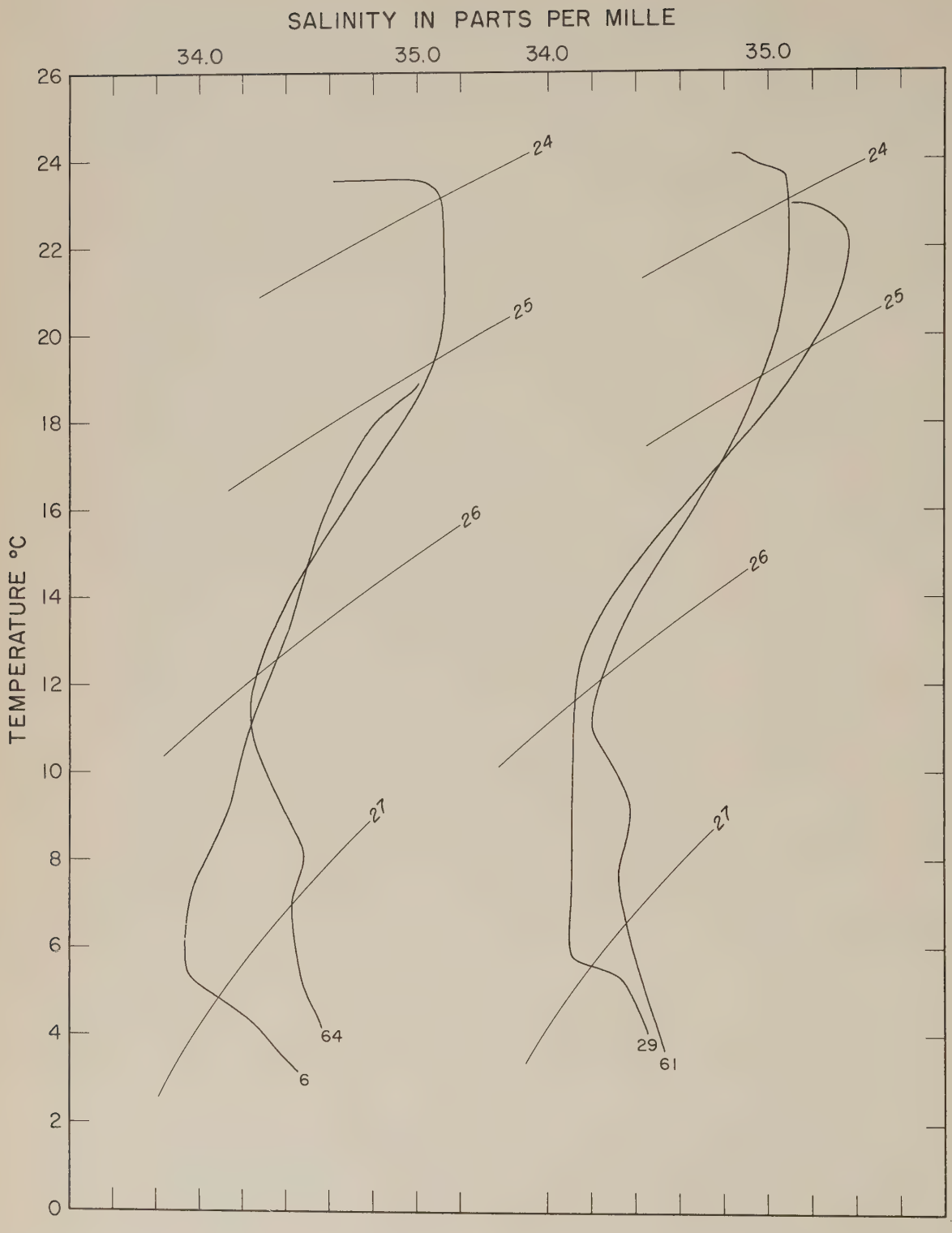

Figure 22.--Temperature-salinity curves for stations 6, 64, 29, and 61, H. M. Smith cruise 20, March 1953.

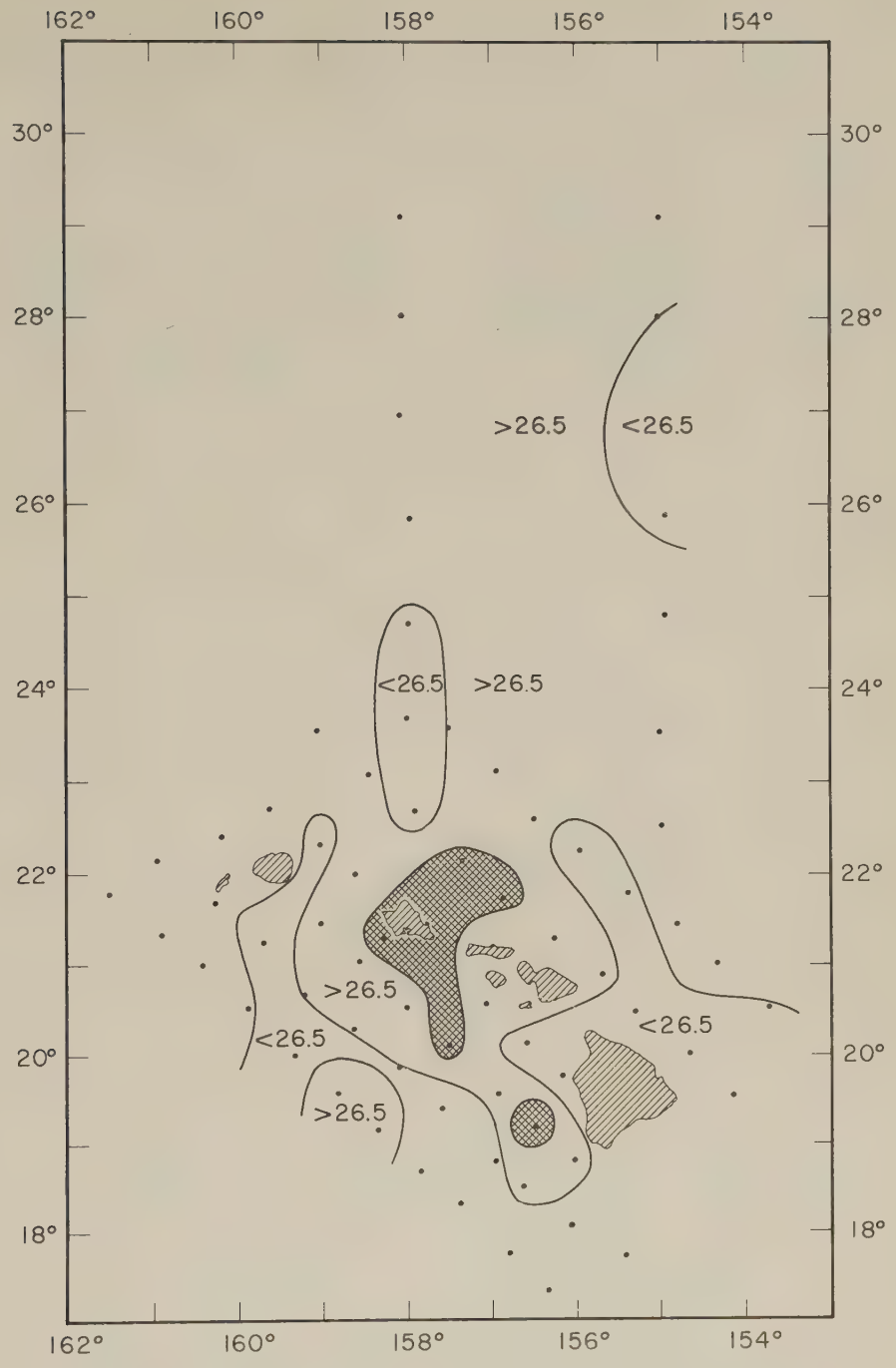

Figure 23.--Schematic diagram of the density (sigma-t) distribution on the salinity minimum layer separated into regions where the sigma-t is greater and less than 26.5. H. M. Smith cruise 20, March 1953. Cross-hatched zones include stations of constant salinity throughout a sigma-t range of 26.1 to 26.8.

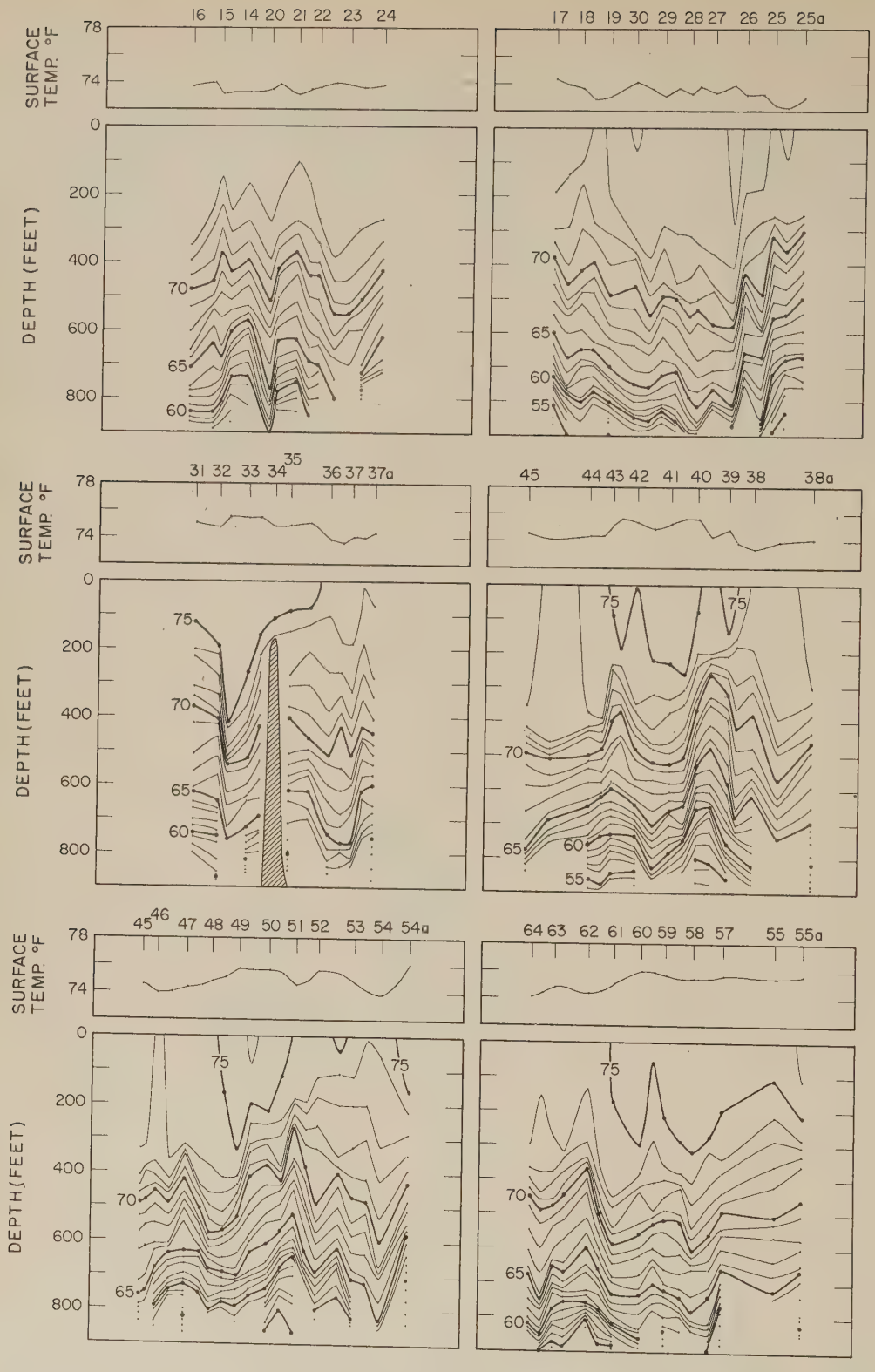

Figure 24.--Vertical bathythermograph temperature (°F.) sections from stations 24 to 16, 25a to 17, 37a to 31, 38a to 45, 54a to 45, and 55a to 64, H. M. Smith cruise 20, March 1953. The upper panels show the surface bucket temperatures in °F.

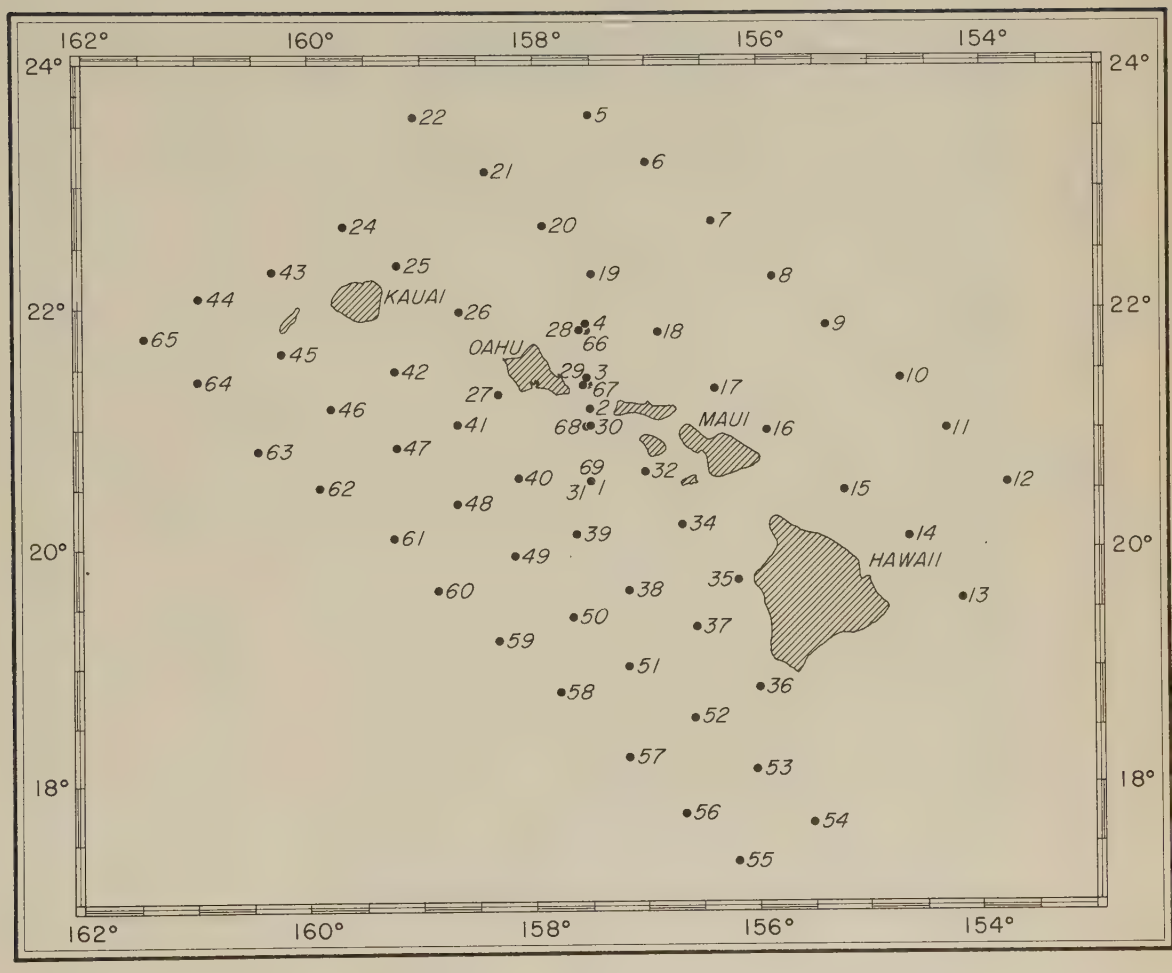

Figure 25.--Station positions, H. M. Smith cruise 21, August 1953

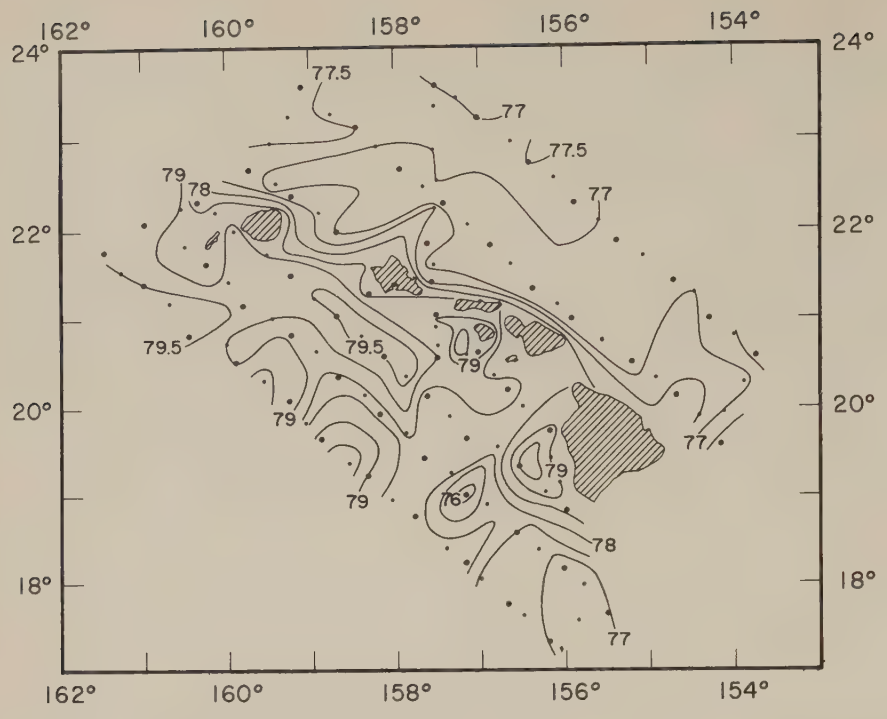

Figure 26.--Surface bucket temperatures in °F. with contour intervals of 0.5°F. H. M. Smith cruise 21, August 1953.

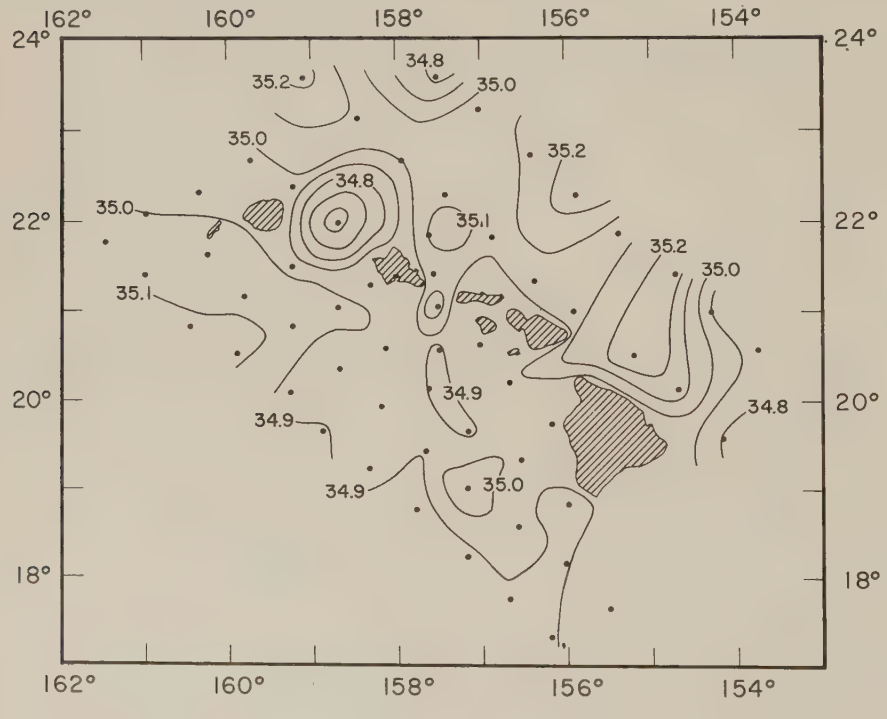

Figure 27.--Surface salinity in °/oo, H. M. Smith cruise 21, August 1953. Contour interval 0.1 °/oo.

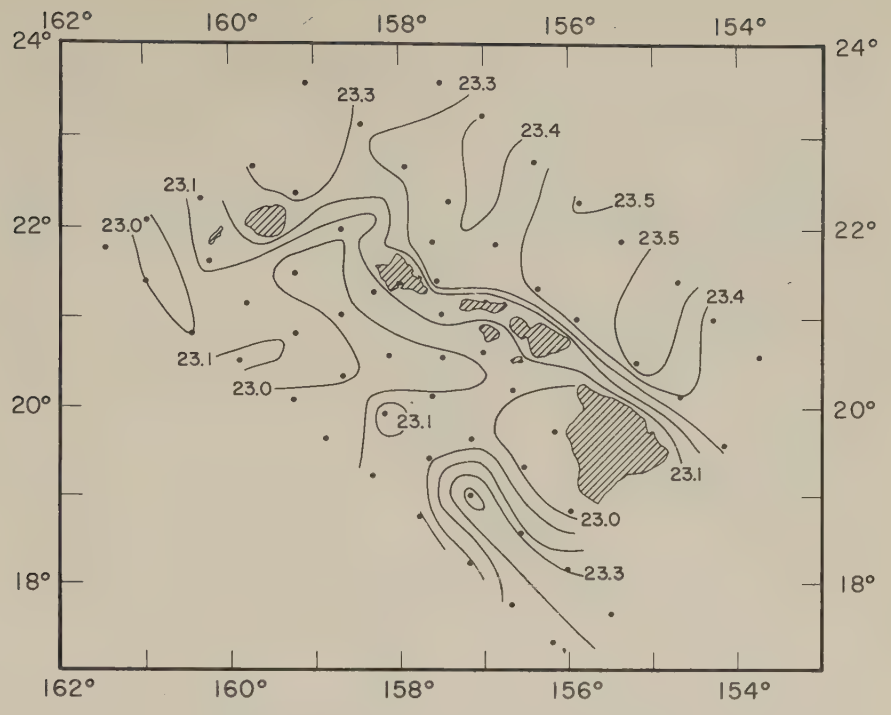

Figure 28.--Surface density (sigma-t), H. M. Smith cruise 21, August 1953. Contour interval 0.1.

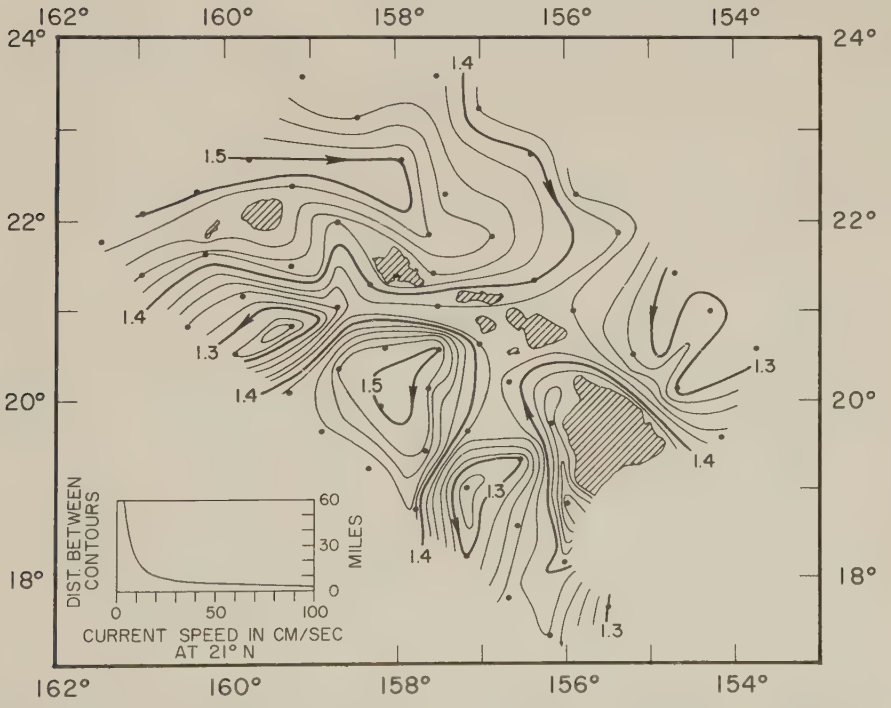

Figure 29.--Dynamic height anomalies (dynamic meters) at the surface relative to 500 m., H. M. Smith cruise 21, August 1953. Contour interval 0.02 dynamic meters.

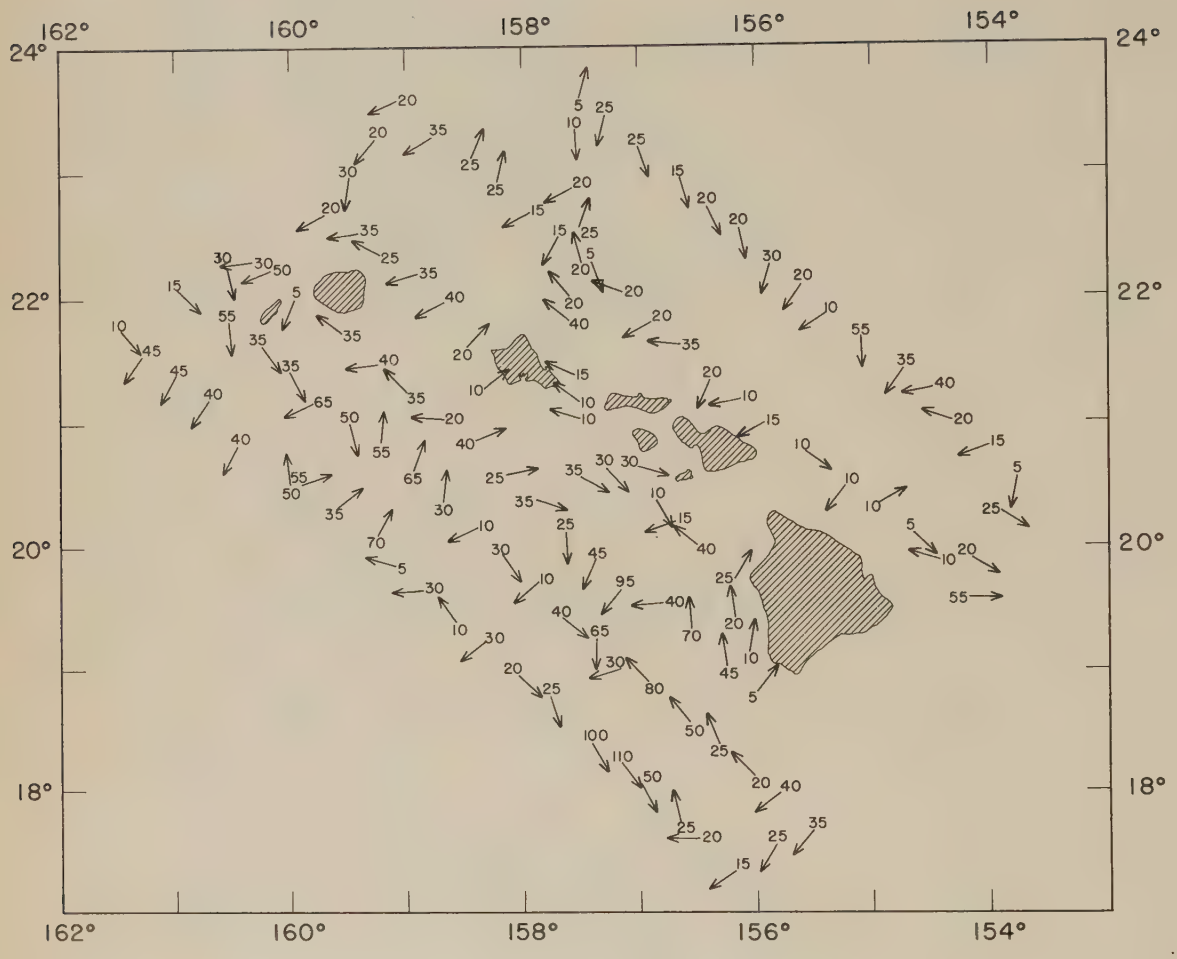

Figure 30.--Geomagnetic electrokinetograph (GEK) current speeds in cm./sec. and directions, H. M. Smith cruise 21, August 1953.

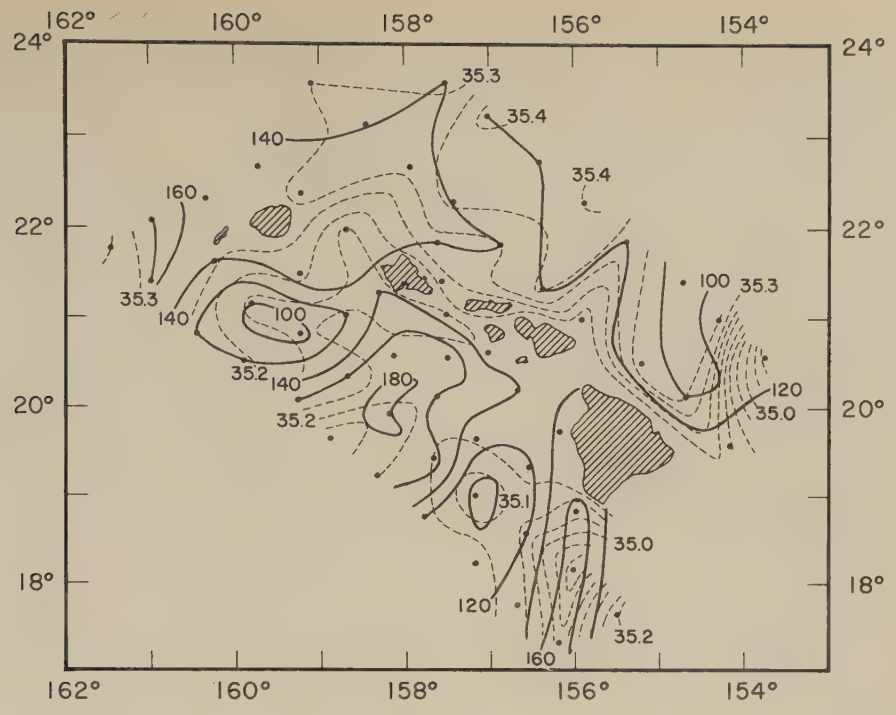

Figure 31.--Bathymetric chart (depth in meters) of the 24.5 sigma-t surface, H. M. Smith cruise 21, August 1953. Contour interval 20 m. Dashed lines indicate the salinity (^{o}/oo) distribution on the surface with contour intervals of 0.05 ^{o}/oo.

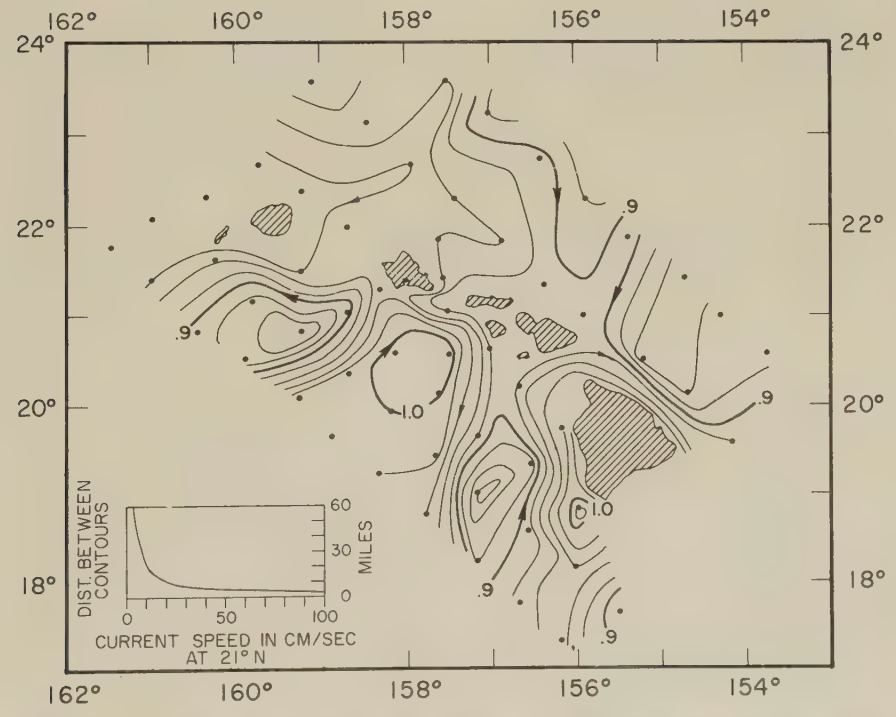

Figure 32.--Dynamic height anomalies (dynamic meters) at the surface relative to 250 m., H. M. Smith cruise 21, August 1953. Contour interval 0.02 dynamic meters.

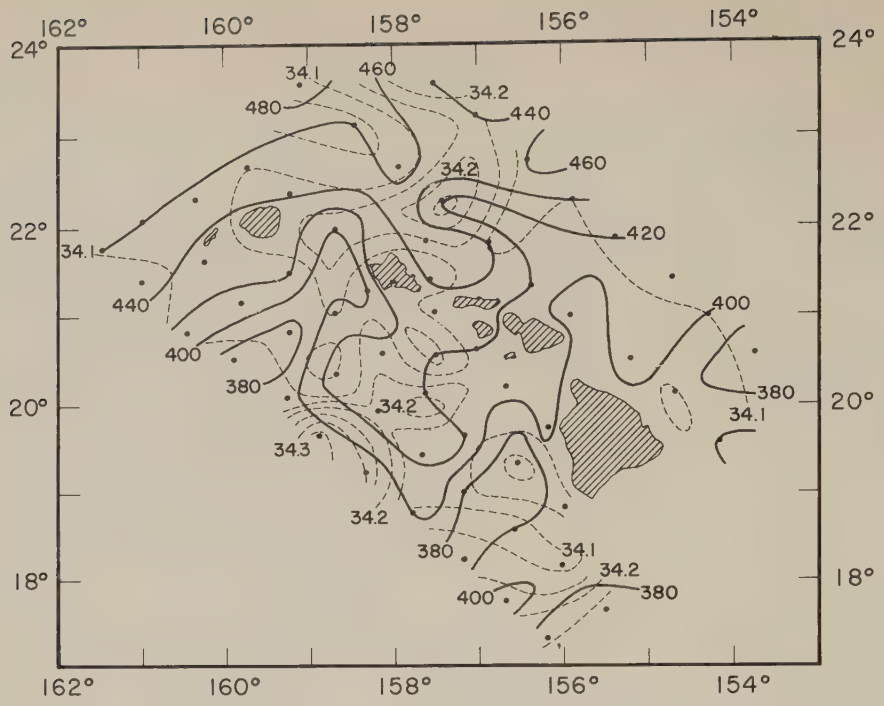

Figure 33.--Bathymetric chart (depth in meters) of the 26.5 sigma-t surface, H. M. Smith cruise 21, August 1953. Contour interval 20 m. Dashed lines indicate the salinity (°/oo) distribution on the surface with contour intervals of 0.05 °/oo.

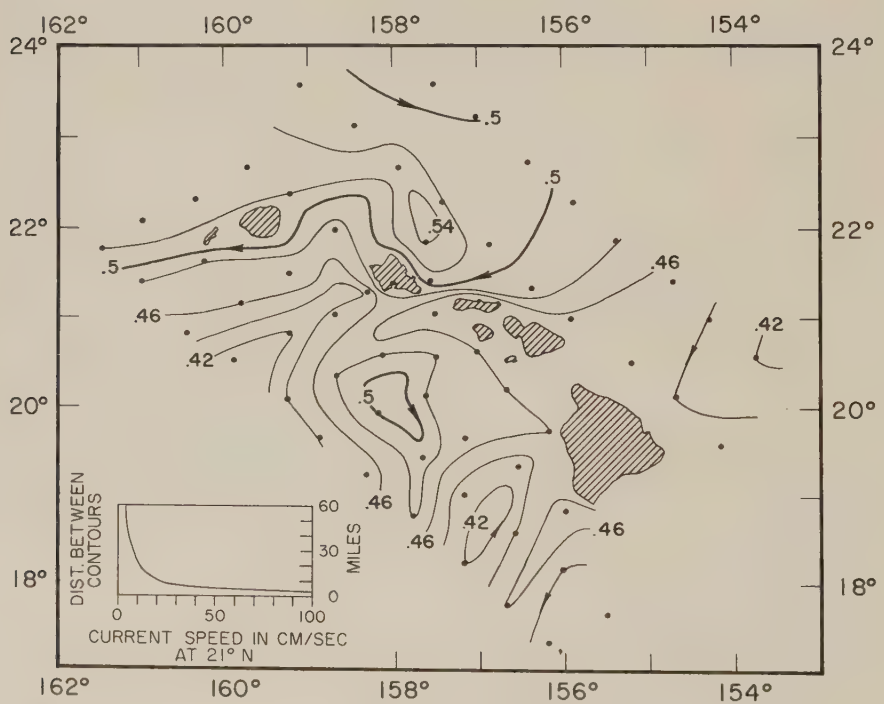

Figure 34.--Dynamic height anomalies (dynamic meters) at 250 m. relative to 500 m., H. M. Smith cruise 21, August 1953. Contour interval 0.02 dynamic meters.

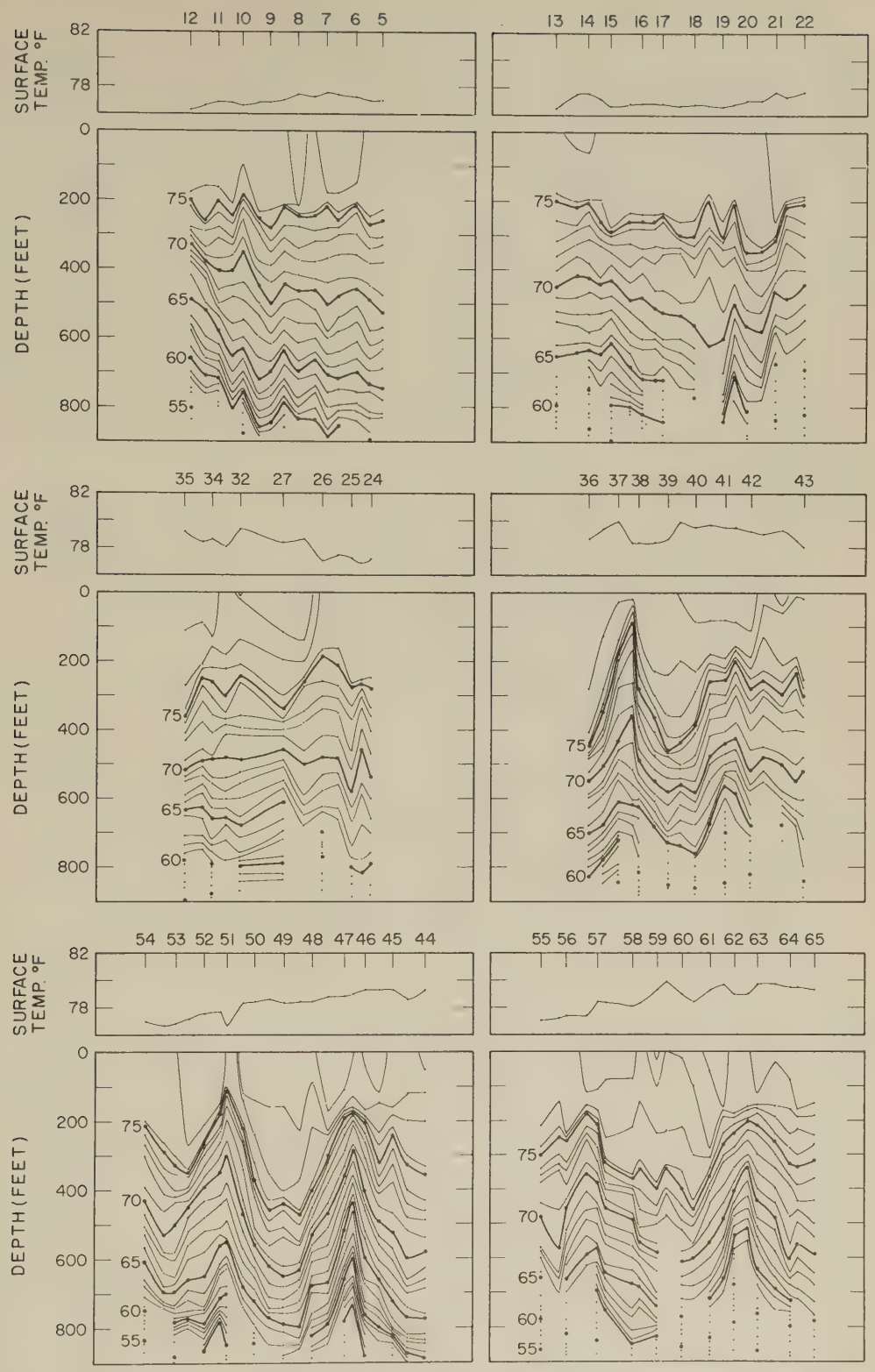

Figure 35.--Vertical bathythermograph temperature (°F.) sections from stations 5 to 12, 22 to 13, 24 to 35, 43 to 36, 44 to 54, and 65 to 55, H. M. Smith cruise 21, August 1953. The upper panels show the surface bucket temperatures in °F.

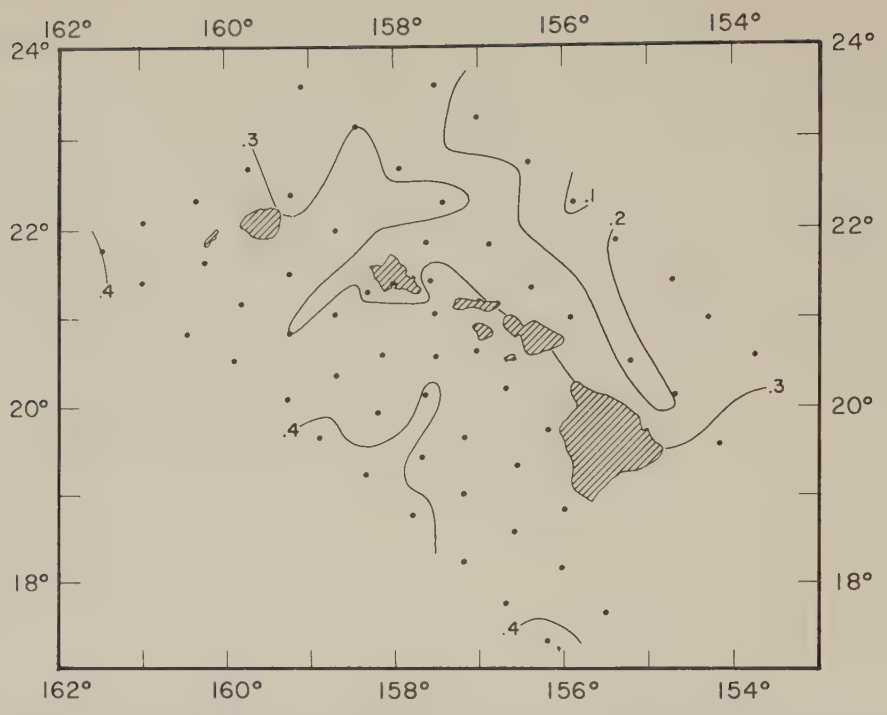

Figure 36.--Surface phosphate-phosphorus distribution in μg-at/l, H. M. Smith cruise 21, August 1953. Contour interval 0.1 μg-at/l.

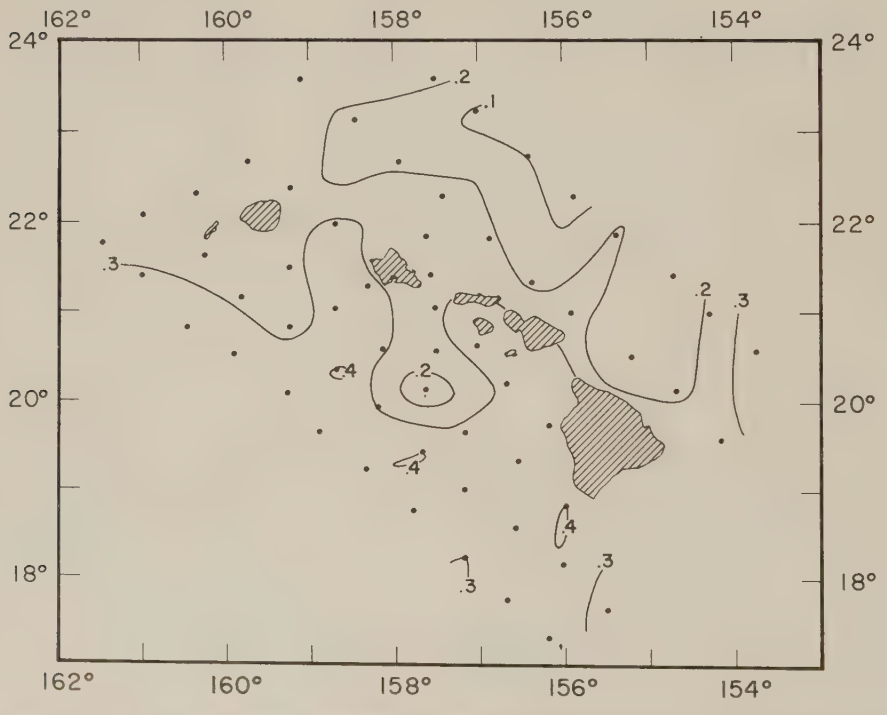

Figure 37.--Phosphate-phosphorus distribution (μg-at/l) on the 24.5 sigma-t surface, H. M. Smith cruise 21, August 1953. Contour interval 0.1 μg-at/l.

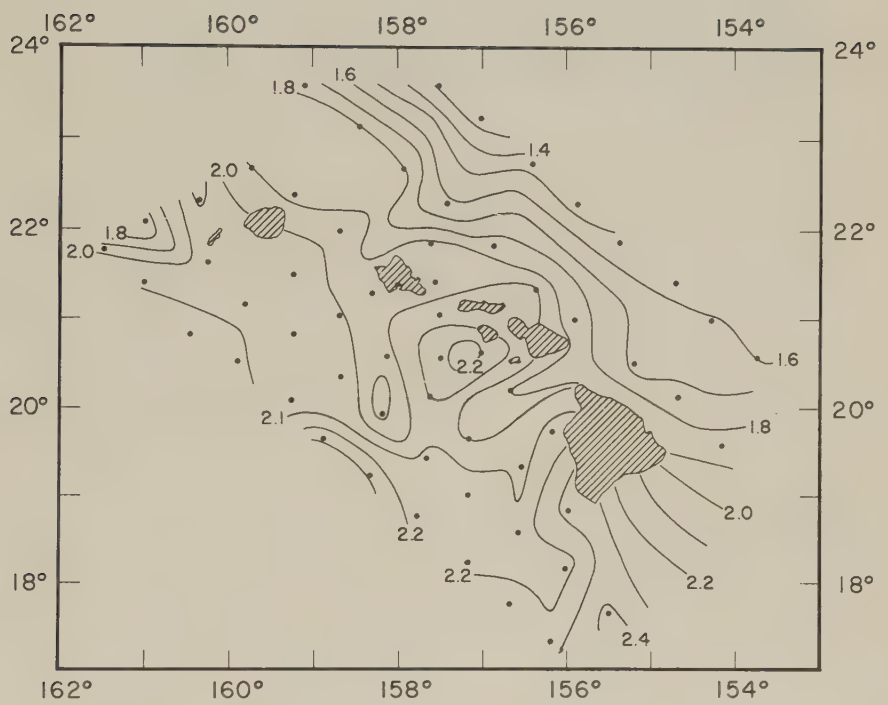

Figure 38.--Phosphate-phosphorus distribution (μg-at/l) on the 26.5 sigma-t surface, H. M. Smith cruise 21, August 1953. Contour interval 0.1 μg-at/l.

APPENDIX

Tabulations of oceanographic data for Hugh M. Smith cruises 17, 20, 21, 26.

Personnel:

Captains:

Hugh M. Smith cruise 17 - R. Johnson
Hugh M. Smith cruise 20 - R. Johnson
Hugh M. Smith cruise 21 - G. Wilkinson
Hugh M. Smith cruise 26 - J. Sutherland

Field Party Chiefs:

Hugh M. Smith cruise 17 - J. King
Hugh M. Smith cruise 20 - T. Cromwell
Hugh M. Smith cruise 21 - E. D. Stroup
Hugh M. Smith cruise 26 - D. Yamashita

In charge of data computations and tabulations - Mrs. M. L. Godfrey

Remarks about the data tabulations:

Weather was recorded according to the WW code in the U. S. Weather Bureau Circular M, Instructions to Marine Meteorological Observers.

Wind velocity was measured by an anemometer located 30 m. above the sea surface.

In the tabulated data, the horizontal line(s) between depths separates the two or more casts necessary during the particular station.

When the interpolated and calculated values are shown for greater depths than the observed values, they were obtained by extrapolation using the data from adjoining stations as a guide.

Measurements of temperature, chemical determinations of salinity, oxygen, and phosphate were made in duplicate and averaged if the values were within the following limits: temperature, above 300 m., 0.05°C., below 300 m., 0.02°C.; salinity 0.04 °/oo; oxygen 0.1 ml/l; phosphate 0.05 µg-at/l. Whenever these limits are exceeded, both values are carried in the tabulations. Obviously wrong values, as determined from the station curves, are omitted from the tabulations.

STATION 1

M/V Hugh M. Smith: Cruise 17, 20°20'N, 159°14'W, September 6, 1952. Messenger time: 1237 GCT. Weather: 15, cloud coverage 10. Wind: 130°, 14 kt. Sea: 1-3 ft. Wire angle: 10°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
05	26.71	34.97	22.81		
28	25.96	35.13	23.16		
52	24.52	34.92	23.45		
100	22.81	35.16	24.13		
148	20.52	35.16	24.76		
196	17.61	34.83	25.25		
243	14.31	34.45	25.72		
291	11.36	34.24	26.14		
338	09.38	34.17	26.43		
387	08.02	34.15	26.62		
482	06.62	34.22	26.88		
578	05.63	34.29	27.06		
675	05.08	34.36	27.18		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.71	34.97	22.80	0.000	1.417
10	26.71	34.97	22.80	0.051	1.366
20	26.60	35.03	22.88	0.101	1.316
30	25.93	35.13	23.17	0.149	1.268
50	24.61	35.12	23.57	0.240	1.177
75	23.78	35.13	23.82	0.346	1.071
100	22.81	35.16	24.12	0.445	0.972
150	20.41	35.16	24.79	0.621	0.796
200	17.42	34.81	25.28	0.771	0.646
250	13.88	34.41	25.77	0.897	0.520
300	10.92	34.22	26.20	1.002	0.415
400	07.80	34.15	26.65	1.169	0.248
500	06.42	34.23	26.91	1.303	0.114
600	05.45	34.31	27.09	1.417	0.000

STATION 2

M/V Hugh M. Smith: Cruise 17, 21°11'N, 159°17'W,
September 6, 1952. Messenger time: 1937 GCT.
Weather: 02, cloud coverage 6. Wind: 070°, 11 kt.
Sea: 3-5 ft. Wire angle: 08°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
03	26.04	35.13	23.14		
28	26.02	35.13	23.14		
52	24.16	35.10	23.69		
99	22.02	35.13	24.33		
147	20.17	35.11	24.82		
195	17.43	34.80	25.28		
243	14.06	34.41	25.74		
290	11.30	34.21	26.12		
338	09.92	34.16	26.33		
386	08.65	34.14	26.52		
482	07.03	34.17	26.78		
578	06.10	34.28	26.99		
676	05.56	34.35	27.11		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.04	35.13	23.14	0.000	1.416
10	26.03	35.13	23.14	0.047	1.369
20	26.02	35.13	23.14	0.095	1.321
30	26.00	35.13	23.15	0.142	1.274
50	24.28	35.10	23.65	0.232	1.184
75	23.25	35.10	23.95	0.336	1.080
100	22.00	35.13	24.33	0.431	0.985
150	20.01	35.10	24.85	0.601	0.815
200	17.41	34.80	25.28	0.749	0.667
250	13.50	34.36	25.81	0.874	0.542
300	10.98	34.20	26.17	0.979	0.437
400	08.39	34.14	26.56	1.152	0.264
500	06.83	34.19	26.82	1.295	0.121
600	05.92	34.30	27.03	1.416	0.000

STATION 3

M/V Hugh M. Smith: Cruise 17, 21°43'N, 159°16'W, September 7, 1952. Messenger time: 0107 GCT. Weather: 02, cloud coverage 3. Wind: 060°, 22 kt. Sea: 3-5 ft. Wire angle: 35°. Depth of water: 1800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	26.13	35.06	23.06		
19	26.10	35.08	23.08		
37	25.97	35.07	23.11		
72	24.07	35.18	23.78		
107	22.44	35.15	24.23		
142	21.56	35.16	24.48		
179	18.78	34.97	25.07		
214	16.68	34.70	25.38		
250	14.29	34.46	25.73		
285	11.70	34.23	26.07		
357	08.90	34.16	26.50		
429	07.86	34.15	26.65		
502	06.82	34.21	26.84		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.13	35.06	23.05	0.000	1.450
10	26.13	35.06	23.05	0.048	1.402
20	26.09	35.08	23.08	0.096	1.354
30	26.02	35.07	23.10	0.144	1.306
50	25.76	35.08	23.18	0.239	1.211
75	23.80	35.18	23.85	0.349	1.101
100	22.57	35.15	24.19	0.447	1.003
150	21.28	35.16	24.55	0.628	0.822
200	17.50	34.81	25.26	0.783	0.667
250	14.29	34.46	25.72	0.911	0.539
300	10.81	34.19	26.19	1.017	0.433
400	08.23	34.15	26.59	1.188	0.262
500	06.84	34.21	26.83	1.329	0.121
600	05.93	34.29	27.02	1.450	0.000

STATION 4

M/V Hugh M. Smith: Cruise 17, 22°28'N, 159°15'W,
September 7, 1952. Messenger time: 0744 GCT.
Weather: 02, cloud coverage 4. Wind: 080°, 19 kt.
Sea: 3-5 ft. Wire angle: 25°. Depth of water: 1800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.90	35.07	23.14		
22	25.88	35.07	23.14		
44	25.28	35.15	23.39		
87	24.28	35.14	23.69		
131	22.09	35.18	24.35		
174	20.81	35.16	24.68		
218	19.22	35.06	25.03		
262	16.61	34.70	25.39		
306	12.88	34.27	25.87		
350	10.58	34.14	26.20		
438	08.51	34.29	26.66		
525	06.30	34.02	26.76		
613	05.21	34.09	26.95		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.90	35.07	23.13	0.000	1.560
10	25.89	35.07	23.14	0.047	1.513
20	25.88	35.07	23.14	0.095	1.465
30	25.87	35.08	23.15	0.142	1.418
50	25.14	35.15	23.43	0.234	1.326
75	24.92	35.15	23.49	0.346	1.214
100	23.34	35.16	23.97	0.451	1.109
150	21.75	35.18	24.44	0.639	0.921
200	19.94	35.11	24.88	0.807	0.753
250	17.19	34.78	25.31	0.954	0.606
300	13.47	34.32	25.79	1.080	0.480
400	09.37	34.22	26.46	1.277	0.283
500	06.87	34.07	26.72	1.430	0.130
600	05.33	34.08	26.92	1.560	0.000

STATION 5

M/V Hugh M. Smith: Cruise 17, 23°14'N, 159°18'W, September 7, 1952. Messenger time: 1452 GCT. Weather: 03, cloud coverage 10. Wind: 090°, 22 kt. Sea: 3-5 ft. Wire angle: 12°.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.15	35.17			
24	25.16	35.21			
48	25.12	35.21			
95	23.23	35.13			
143	22.20	35.20			
190	21.32	35.25			
238	19.63	35.11			
286	16.56	34.72			
334	12.68	34.10			
381	10.64	34.14			
477	08.04	34.11			
573	06.06	34.05			
671	04.96	34.14			

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.15	35.17	23.44	0.000	1.615
10	25.15	35.19	23.46	0.044	1.571
20	25.16	35.21	23.47	0.089	1.526
30	25.16	35.21	23.47	0.133	1.482
50	25.12	35.21	23.48	0.222	1.393
75	25.12	35.21	23.48	0.333	1.282
100	23.06	35.14	24.04	0.437	1.178
150	22.09	35.22	24.37	0.625	0.990
200	21.12	35.25	24.67	0.800	0.815
250	19.09	35.05	25.05	0.958	0.657
300	15.22	34.51	25.56	1.096	0.519
400	10.07	34.14	26.28	1.313	0.302
500	07.52	34.09	26.65	1.479	0.136
600	05.67	34.07	26.88	1.615	0.000

STATION 6

M/V Hugh M. Smith: Cruise 17, 23°09'N, 158°26'W, September 7, 1952. Messenger time: 2153 GCT. Weather: 03, cloud coverage 4. Wind: 080°, 19 kt. Sea: 3-5 ft. Wire angle: 10°.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.38	35.18	23.38		
24	25.30	35.19	23.41		
48	25.28	35.21	23.44		
95	22.79	35.30	24.24		
143	21.35	35.22	24.58		
191	19.90	35.14	24.91		
239	17.10	34.77	25.33		
287	14.24	34.43	25.71		
335	11.82	34.23	26.04		
383	10.41	34.10	26.20		
479	08.24	34.04	26.50		
575	05.95	34.02	26.81		
671	04.98	34.06	26.96		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.38	35.18	23.38	0.000	1.543
10	25.32	35.18	23.40	0.045	1.498
20	25.30	35.19	23.41	0.090	1.453
30	25.30	35.19	23.41	0.135	1.408
50	25.28	35.21	23.43	0.225	1.318
75	23.02	35.30	24.17	0.328	1.215
100	22.71	35.30	24.26	0.421	1.122
150	21.25	35.22	24.61	0.599	0.944
200	19.46	35.10	24.99	0.759	0.784
250	16.41	34.68	25.42	0.901	0.642
300	13.60	34.37	25.80	1.024	0.519
400	10.03	34.08	26.24	1.232	0.311
500	07.67	34.03	26.58	1.402	0.141
600	05.66	34.03	26.85	1.543	0.000

STATION 7

M/V Hugh M. Smith: Cruise 17, 22°30'N, 158°20'W,
September 8, 1952. Messenger time: 0348 GCT.
Weather: 02, cloud coverage 3. Wind: 090°, 18 kt.
Sea: 3-5 ft. Wire angle: 15°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
01	25.40	35.19	23.38		
23	25.36	35.19	23.39		
46	24.40	35.14	23.65		
91	22.44	35.16	24.24		
137	21.16	35.23	24.64		
183	19.34	35.08	25.01		
228	16.78	34.74	25.38		
274	13.55	34.36	25.80		
320	12.04	34.26	26.03		
365	10.32	34.14	26.24		
457	08.03	34.12	26.60		
550	06.60	34.18	26.85		
646	06.02	34.29	27.01		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.40	35.19	23.38	0.000	1.474
10	25.38	35.19	23.38	0.045	1.429
20	25.36	35.19	23.39	0.090	1.384
30	25.33	35.19	23.40	0.135	1.339
50	24.01	35.14	23.76	0.222	1.252
75	23.02	35.15	24.06	0.322	1.152
100	22.25	35.17	24.29	0.417	1.057
150	20.60	35.20	24.77	0.590	0.884
200	18.92	35.03	25.08	0.745	0.729
250	14.88	34.51	25.63	0.879	0.595
300	12.72	34.31	25.93	0.994	0.480
400	09.34	34.12	26.39	1.187	0.287
500	07.25	34.15	26.73	1.343	0.131
600	06.28	34.22	26.92	1.474	0.000

STATION 8

M/V Hugh M. Smith: Cruise 17, 21°42'N, 158°20'W, September 8, 1952. Messenger time: first cast 1016 GCT, second cast 1042 GCT. Weather: 63, cloud coverage 7. Wind: 080°, 21 kt. Sea: 3-5 ft. Wire angle: first cast 15°, second cast 15°. Depth of water: 500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.82	35.11	23.19		
23	25.82	35.11	23.19		
45	25.44	35.18	23.36		
92	23.80	35.20	23.87		
137	21.78	35.32	24.54		
183	19.50	35.16	25.03		
229	15.86	34.64	25.52		
275	13.90	34.41	25.77		
321	11.44	34.24	26.12		
367	10.41	34.23	26.30		
460	08.07	34.18	26.54		
554	06.76	34.23	26.87		
648	05.85	34.32	27.06		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.82	35.11	23.19	0.000	1.500
10	25.82	35.11	23.19	0.047	1.453
20	25.82	35.11	23.19	0.094	1.406
30	25.60	35.16	23.29	0.140	1.360
50	25.43	35.18	23.36	0.232	1.268
75	24.33	35.20	23.71	0.341	1.159
100	23.70	35.20	23.90	0.445	1.055
150	20.68	35.27	24.80	0.626	0.874
200	19.30	35.14	25.06	0.781	0.719
250	14.80	34.51	25.65	0.915	0.585
300	12.60	34.30	25.94	1.029	0.471
400	09.40	34.21	26.45	1.219	0.281
500	07.45	34.20	26.74	1.372	0.128
600	06.28	34.27	26.96	1.500	0.000

STATION 9

M/V Hugh M. Smith: Cruise 17, 20°58'N, 158°14'W, September 8, 1952. Messenger time: 2105 GCT. Weather: 02, cloud coverage 3. Wind: 080°, 19 kt. Sea: 3-5 ft. Wire angle: 35°. Depth of water: 1900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.47	35.10	23.29		
16	25.46	35.08	23.28		
34	25.39	35.11	23.33		
66	24.04	35.08	23.71		
99	22.64	35.21	24.22		
133	22.00	35.23	24.41		
165	21.23	35.19	24.59		
197	18.56	34.93	25.10		
230	15.50	34.52	25.51		
262	14.02	34.40	25.74		
328	11.02	34.17	26.15		
394	08.84	34.15	26.50		
458	07.58	34.19	26.72		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.47	35.10	23.29	0.000	1.473
10	25.47	35.09	23.28	0.046	1.427
20	25.46	35.09	23.28	0.092	1.381
30	25.42	35.10	23.30	0.138	1.335
50	25.36	35.11	23.33	0.230	1.243
75	23.24	35.15	23.99	0.336	1.137
100	22.63	35.21	24.21	0.432	1.041
150	21.50	35.21	24.53	0.613	0.860
200	18.35	34.90	25.12	0.772	0.701
250	14.60	34.44	25.64	0.905	0.568
300	12.22	34.24	25.97	1.019	0.454
400	08.72	34.15	26.51	1.204	0.269
500	06.91	34.20	26.82	1.350	0.123
600	05.91	34.25	26.99	1.473	0.000

STATION 10

M/V Hugh M. Smith: Cruise 17, 20°16'N, 158°15'W,
September 9, 1952. Messenger time: 0318 GCT.
Weather: 16, cloud coverage 8. Wind: 080°, 19 kt.
Sea: 5-8 ft. Wire angle: 25°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	26.20	35.01	23.00		
24	26.20	35.04	23.02		
47	25.90	35.00	23.08		
95	25.06	35.03	23.37		
141	21.86	35.15	24.39		
188	19.32	34.96	24.93		
235	15.55	34.52	25.50		
282	12.34	34.19	25.92		
329	10.19	34.13	26.26		
377	08.90	34.12	26.46		
472	07.32	-	-		
566	06.14	34.23	26.95		
664	05.56	34.29	27.07		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.20	35.01	22.99	0.000	1.540
10	26.20	35.02	23.00	0.049	1.491
20	26.20	35.03	23.01	0.097	1.443
30	26.20	35.04	23.02	0.146	1.394
50	25.88	35.00	23.09	0.243	1.297
75	25.87	35.00	23.09	0.363	1.177
100	24.89	35.04	23.42	0.480	1.060
150	21.58	35.14	24.46	0.681	0.859
200	18.69	34.91	25.04	0.844	0.696
250	14.98	34.45	25.57	0.981	0.559
300	11.29	34.15	26.08	1.093	0.447
400	08.48	34.13	26.53	1.272	0.268
500	06.90	34.19	26.81	1.417	0.123
600	05.92	34.25	26.99	1.540	0.000

STATION 11

M/V Hugh M. Smith: Cruise 17, 19°26'N, 158°15'W, September 9, 1952. Messenger time: 0940 GCT. Weather: 02, cloud coverage 9. Wind: 150°, 6 kt. Sea: 3-5 ft. Wire angle: 12°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.01	35.01	23.06		
24	26.02	35.04	23.08		
47	25.92	35.01	23.09		
92	24.23	35.08	23.65		
140	22.01	35.17	24.36		
187	19.66	35.09	24.94		
233	16.00	34.59	25.45		
280	11.95	34.21	26.01		
327	10.04	34.12	26.28		
374	08.53	34.10	26.51		
468	07.20	34.25	26.82		
562	06.42	34.34	27.00		
659	05.66	34.36	27.11		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.01	35.01	23.05	0.000	1.491
10	26.01	35.02	23.06	0.048	1.443
20	26.02	35.03	23.07	0.096	1.395
30	26.01	35.03	23.07	0.144	1.347
50	25.90	35.01	23.09	0.241	1.250
75	25.35	35.03	23.27	0.359	1.132
100	23.88	35.10	23.77	0.469	1.022
150	21.54	35.16	24.48	0.661	0.830
200	18.81	34.99	25.08	0.823	0.668
250	14.28	34.42	25.69	0.956	0.535
300	11.11	34.16	26.12	1.064	0.427
400	08.01	34.14	26.61	1.238	0.253
500	06.92	34.30	26.89	1.374	0.117
600	06.12	34.35	27.04	1.491	0.000

STATION 12

M/V Hugh M. Smith: Cruise 17, 18°52'N, 157°21'W,
September 9, 1952. Messenger time: 1850 GCT.
Weather: 02, cloud coverage 5. Wind: 110°, 18 kt.
Sea: 5-8 ft. Wire angle: 08°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
03	26.30	34.99	22.95		
27	25.58	35.07	23.24		
51	25.16	35.07	23.37		
98	22.10	35.20	24.36		
146	20.16	35.10	24.81		
194	17.60	34.78	25.22		
243	13.70	34.45	25.84		
291	11.08	34.19	26.15		
339	09.20	34.11	26.41		
387	07.83	34.16	26.66		
484	06.56	34.14	26.82		
582	05.73	34.20	26.98		
680	05.35	34.30	27.10		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.30	34.99	22.95	0.000	1.412
10	26.30	34.99	22.95	0.049	1.363
20	26.00	35.03	23.07	0.098	1.314
30	25.57	35.07	23.24	0.145	1.267
50	25.20	35.07	23.35	0.237	1.175
75	24.52	35.09	23.57	0.349	1.063
100	22.02	35.20	24.38	0.448	0.964
150	19.90	35.07	24.86	0.617	0.795
200	17.40	34.76	25.25	0.765	0.647
250	13.00	34.37	25.92	0.889	0.523
300	10.72	34.17	26.19	0.990	0.422
400	07.60	34.17	26.70	1.155	0.257
500	06.40	34.14	26.84	1.290	0.122
600	05.63	34.21	26.99	1.412	0.000

STATION 13

M/V Hugh M. Smith: Cruise 17, 19°29'N, 157°16'W, September 10, 1952. Messenger time: 0042 GCT. Weather: 02, cloud coverage 3. Wind: 050°, 11 kt. Sea: 5-8 ft. Wire angle: 15°. Depth of water: 2000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.78	35.25	23.62		
25	22.96	35.16	24.09		
49	21.96	35.17	24.38		
97	20.38	35.15	24.79		
145	18.41	34.91	25.12		
193	15.46	34.52	25.52		
242	12.69	34.24	25.89		
291	10.64	34.16	26.20		
340	09.42	34.07	26.34		
388	08.16	34.05	26.53		
485	06.75	34.14	26.80		
582	05.61	34.32	27.08		
680	05.10	34.40	27.21		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.78	35.25	23.61	0.000	1.291
10	24.20	35.20	23.75	0.042	1.249
20	23.22	35.17	24.01	0.083	1.208
30	22.70	35.16	24.16	0.121	1.170
50	21.88	35.17	24.40	0.194	1.097
75	21.00	35.16	24.63	0.281	1.010
100	20.24	35.14	24.82	0.362	0.929
150	18.19	34.88	25.15	0.513	0.778
200	15.11	34.47	25.55	0.647	0.644
250	12.40	34.23	25.93	0.763	0.528
300	10.43	34.14	26.22	0.863	0.428
400	07.97	34.05	26.55	1.034	0.257
500	06.53	34.18	26.85	1.176	0.115
600	05.50	34.34	27.11	1.291	0.000

STATION 14

M/V Hugh M. Smith: Cruise 17, 20°15'N, 157°22'W, September 10, 1952. Messenger time: 0705 GCT. Weather: 62, cloud coverage 10. Wind: 120°, 13 kt. Sea: 3-5 ft. Wire angle: 32°. Depth of water: 2100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.51	35.22	23.68		
17	24.52	35.22	23.67		
35	23.34	35.13	23.95		
71	22.06	35.16	24.34		
108	20.68	35.15	24.71		
144	19.30	35.07	25.02		
181	16.75	34.70	25.36		
217	14.60	34.50	25.69		
253	12.76	34.31	25.93		
289	10.82	34.18	26.19		
363	08.92	34.13	26.47		
437	07.10	34.13	26.74		
511	06.08	34.23	26.96		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.51	35.22	23.67	0.000	1.314
10	24.51	35.22	23.67	0.042	1.272
20	24.52	35.22	23.67	0.085	1.229
30	23.98	35.16	23.78	0.127	1.187
50	22.75	35.14	24.13	0.206	1.108
75	22.00	35.16	24.35	0.299	1.015
100	21.14	35.16	24.59	0.386	0.928
150	19.00	35.03	25.06	0.545	0.769
200	15.67	34.60	25.53	0.682	0.632
250	12.99	34.33	25.89	0.799	0.515
300	10.53	34.17	26.23	0.900	0.414
400	07.83	34.12	26.62	1.067	0.247
500	06.23	34.21	26.92	1.202	0.112
600	05.45	34.34	27.12	1.314	0.000

STATION 15

M/V Hugh M. Smith: Cruise 17, 20°43'N, 157°26'W,
September 10, 1952. Messenger time: 1247 GCT.
Weather: 02, cloud coverage 9. Wind: 090°, 6 kt.
Sea: 1-3 ft. Wire angle: 10°. Depth of water: 1500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.92	35.03	23.10		
24	25.86	35.06	23.14		
48	25.62	35.01	23.18		
95	23.41	35.10	23.91		
143	21.06	35.10	24.57		
192	19.18	34.99	24.99		
240	15.38	34.52	25.54		
288	13.04	34.29	25.85		
335	09.88	34.12	26.30		
383	08.91	34.14	26.48		
479	07.44	34.18	26.73		
575	06.32	34.23	26.92		
672	05.52	34.39	27.15		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.92	35.03	23.10	0.000	1.515
10	25.90	35.04	23.11	0.048	1.467
20	25.89	35.05	23.12	0.095	1.420
30	25.80	35.05	23.15	0.143	1.372
50	25.60	35.01	23.18	0.237	1.278
75	25.20	35.02	23.31	0.354	1.161
100	23.33	35.11	23.94	0.462	1.053
150	21.00	35.10	24.58	0.647	0.868
200	18.70	34.94	25.07	0.807	0.708
250	14.68	34.45	25.63	0.942	0.573
300	12.40	34.24	25.94	1.056	0.459
400	08.61	34.15	26.53	1.242	0.273
500	07.15	34.19	26.78	1.389	0.126
600	06.09	34.26	26.97	1.515	0.000

STATION 16

M/V Hugh M. Smith: Cruise 17, 21°48'N, 157°18'W,
September 10, 1952. Messenger time: 2118 GCT.
Weather: 02, cloud coverage 8. Wind: 080°, 16 kt.
Sea: 3-5 ft. Wire angle: 25°. Depth of water: 1900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.19	35.13	23.40		
23	25.13	35.09	23.39		
45	25.08	35.11	23.42		
91	22.72	35.16	24.16		
135	21.82	35.25	24.48		
181	19.92	35.16	24.92		
226	17.55	34.81	25.25		
271	14.52	34.44	25.66		
317	11.40	34.19	26.09		
362	09.46	34.11	26.37		
452	07.09	34.12	26.74		
542	05.95	34.22	26.96		
633	05.58	34.35	27.11		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.19	35.13	23.40	0.000	1.466
10	25.15	35.11	23.39	0.045	1.421
20	25.14	35.10	23.39	0.090	1.376
30	25.10	35.10	23.40	0.135	1.331
50	25.05	35.11	23.43	0.225	1.241
75	23.26	35.14	23.98	0.330	1.136
100	22.58	35.18	24.21	0.427	1.039
150	21.50	35.25	24.56	0.607	0.859
200	18.99	35.05	25.08	0.766	0.700
250	15.79	34.58	25.49	0.905	0.561
300	12.50	34.26	25.93	1.023	0.443
400	08.29	34.10	26.54	1.209	0.257
500	06.36	34.17	26.87	1.350	0.116
600	05.63	34.31	27.07	1.466	0.000

STATION 17

M/V Hugh M. Smith: Cruise 17, 22°26'N, 157°16'W,
September 11, 1952. Messenger time: 0335 GCT.
Weather: 03, cloud coverage 6. Wind: 100°, 22 kt.
Sea: 5-8 ft. Wire angle: 15°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.30	35.22	23.44		
24	25.30	35.23	23.44		
48	24.64	35.45	23.81		
95	21.49	35.26	24.58		
143	20.08	35.22	24.93		
190	18.64	35.04	25.16		
237	16.01	34.66	25.50		
286	13.60	34.42	25.84		
333	11.36	34.20	26.11		
380	09.42	34.14	26.40		
476	07.29	34.13	26.72		
573	05.14	34.10	26.97		
669	04.62	34.22	27.12		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.30	35.22	23.43	0.000	1.426
10	25.30	35.22	23.43	0.045	1.381
20	25.30	35.23	23.44	0.089	1.337
30	25.30	35.28	23.48	0.134	1.292
50	24.46	35.45	23.86	0.219	1.207
75	22.74	35.24	24.21	0.316	1.110
100	21.37	35.26	24.60	0.405	1.021
150	20.00	35.21	24.94	0.567	0.859
200	18.55	35.02	25.16	0.715	0.711
250	15.32	34.59	25.60	0.849	0.577
300	12.93	34.35	25.92	0.965	0.461
400	08.99	34.14	26.46	1.155	0.271
500	06.62	34.12	26.79	1.304	0.122
600	04.95	34.13	27.01	1.426	0.000

STATION 18

M/V Hugh M. Smith: Cruise 17, 21°45'N, 156°20'W,
September 11, 1952. Messenger time: 1238 GCT.
Weather: 02, cloud coverage 4. Wind: 100°, 19 kt.
Sea: 3-5 ft. Wire angle: 28°. Depth of water: 3000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.10	35.14	23.44		
21	25.12	35.14	23.43		
42	25.00	35.32	23.60		
84	22.61	35.22	24.23		
126	21.56	35.29	24.58		
170	19.94	35.22	24.96		
212	17.36	34.79	25.28		
256	14.88	34.50	25.63		
298	11.74	34.20	26.04		
341	10.52	34.16	26.23		
427	08.08	34.08	26.56		
514	07.02	34.21	26.82		
601	05.83	34.22	26.98		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	25.10	35.14	23.43	0.000	1.447
10	25.11	35.14	23.43	0.045	1.402
20	25.12	35.14	23.43	0.089	1.358
30	25.07	35.20	23.49	0.134	1.313
50	24.92	35.35	23.65	0.221	1.226
75	23.01	35.23	24.12	0.322	1.125
100	21.99	35.27	24.44	0.414	1.033
150	20.96	35.28	24.73	0.584	0.863
200	18.75	35.03	25.12	0.739	0.708
250	15.34	34.55	25.56	0.874	0.573
300	11.62	34.20	26.05	0.987	0.460
400	08.68	34.09	26.47	1.170	0.277
500	07.23	34.19	26.77	1.320	0.127
600	05.84	34.22	26.97	1.447	0.000

STATION 19

M/V Hugh M. Smith: Cruise 17, 21°17'N, 156°16'W, September 11, 1952. Messenger time: 1807 GCT. Weather: 02, cloud coverage 6. Wind: 090°, 21 kt. Sea: 3-5 ft. Wire angle: 08°. Depth of water 600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.59	35.09	23.25		
24	25.58	35.10	23.26		
47	24.08	35.22	23.80		
95	22.02	35.28	24.44		
143	20.84	35.29	24.77		
190	18.97	35.04	25.08		
236	16.10	34.62	25.45		
285	12.58	34.28	25.94		
332	10.62	34.18	26.22		
381	09.12	-	-		
476	06.94	34.15	26.78		
572	06.02	34.27	27.00		
667	05.64	34.37	27.12		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.59	35.09	23.24	0.000	1.428
10	25.59	35.09	23.24	0.046	1.382
20	25.58	35.10	23.26	0.093	1.335
30	25.54	35.10	23.27	0.139	1.289
50	23.90	35.23	23.86	0.226	1.202
75	22.60	35.27	24.27	0.323	1.105
100	21.80	35.29	24.51	0.412	1.016
150	20.66	35.28	24.81	0.579	0.849
200	18.40	34.95	25.15	0.731	0.697
250	15.36	34.54	25.55	0.866	0.562
300	11.94	34.23	26.02	0.980	0.448
400	08.61	34.10	26.49	1.165	0.263
500	06.62	34.19	26.85	1.309	0.119
600	05.88	34.31	27.04	1.428	0.000

STATION 20

M/V Hugh M. Smith: Cruise 17, 21°02'N, 155°37'W,
September 12, 1952. Messenger time: 0006 GCT.
Weather: 02, cloud coverage 2. Wind: 110°, 13 kt.
Sea: 1-3 ft. Wire angle: 25°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.21	35.28	23.51		
23	25.06	35.31	23.58		
46	24.96	35.30	23.60		
91	22.33	35.22	24.31		
136	21.19	35.28	24.67		
181	19.98	35.22	24.95		
226	17.68	34.84	25.25		
272	14.21	34.42	25.71		
317	11.71	34.22	26.06		
363	09.24	34.13	26.42		
455	07.32	34.06	26.65		
546	06.21	34.20	26.92		
639	05.60	34.29	27.06		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	25.21	35.28	23.50	0.000	1.456
10	25.12	35.31	23.55	0.044	1.412
20	25.06	35.31	23.57	0.087	1.369
30	25.04	35.30	23.57	0.130	1.326
50	24.97	35.30	23.59	0.217	1.239
75	23.40	35.22	24.00	0.320	1.136
100	22.11	35.23	24.38	0.414	1.042
150	20.62	35.27	24.82	0.584	0.872
200	19.39	35.14	25.04	0.739	0.717
250	16.42	34.69	25.43	0.879	0.577
300	12.72	34.28	25.91	1.000	0.456
400	08.34	34.08	26.52	1.188	0.268
500	06.70	34.14	26.80	1.334	0.122
600	05.80	34.26	27.01	1.456	0.000

STATION 21

M/V Hugh M. Smith: Cruise 17, 20°28'N, 155°37'W,
September 12, 1952. Messenger time: 0505 GCT.
Weather: 02, cloud coverage 3. Wind: 090°, 20 kt.
Sea: 3-5 ft. Wire angle: 12°. Depth of water: 1500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.51	35.05	23.24		
23	25.51	35.06	23.25		
47	25.02	35.26	23.55		
94	23.50	35.22	23.98		
142	21.34	35.26	24.62		
189	19.50	35.11	24.99		
237	17.11	34.76	25.32		
284	13.22	34.31	25.83		
332	10.56	34.17	26.23		
380	09.08	34.13	26.44		
476	07.18	34.18	26.77		
572	05.49	34.21	27.01		
668	05.26	34.34	27.14		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.51	35.05	23.24	0.000	1.484
10	25.51	35.05	23.24	0.046	1.438
20	25.51	35.06	23.25	0.093	1.391
30	25.46	35.08	23.28	0.139	1.345
50	25.00	35.26	23.55	0.229	1.255
75	24.81	35.26	23.61	0.337	1.147
100	23.44	35.22	23.99	0.441	1.043
150	21.04	35.25	24.69	0.623	0.861
200	19.10	35.06	25.06	0.780	0.704
250	16.10	34.64	25.46	0.920	0.564
300	12.25	34.25	25.97	1.037	0.447
400	08.62	34.14	26.52	1.222	0.262
500	06.62	34.19	26.85	1.366	0.118
600	05.38	34.25	27.05	1.484	0.000

STATION 22

M/V Hugh M. Smith: Cruise 17, 20°12'N, 156°19'W, September 12, 1952. Messenger time: 1113 GCT.
Weather: 02, cloud coverage 2. Wind: 090°, 22 kt.
Sea: 3-5 ft. Wire angle: 15°. Depth of water: 800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.70	35.05	23.18		
24	25.70	35.01	23.15		
48	25.64	35.00	23.17		
97	22.32	35.12	24.24		
145	20.61	35.12	24.71		
193	18.74	34.98	25.09		
241	15.06	34.50	25.59		
289	12.96	34.32	25.90		
337	10.40	34.18	26.26		
385	09.06	34.17	26.48		
482	07.04	34.22	26.82		
578	06.12	34.26	26.98		
674	05.53	34.36	27.13		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.70	35.05	23.18	0.000	1.462
10	25.70	35.03	23.17	0.047	1.415
20	25.70	35.01	23.15	0.094	1.368
30	25.68	35.00	23.15	0.142	1.320
50	25.63	35.00	23.16	0.236	1.226
75	23.41	35.11	23.91	0.346	1.116
100	22.21	35.12	24.26	0.442	1.020
150	20.48	35.12	24.74	0.617	0.845
200	18.45	34.94	25.13	0.771	0.691
250	14.58	34.45	25.65	0.904	0.558
300	12.41	34.29	25.97	1.017	0.445
400	08.62	34.18	26.55	1.200	0.262
500	06.84	34.23	26.85	1.342	0.120
600	05.95	34.29	27.01	1.462	0.000

STATION 23

M/V Hugh M. Smith: Cruise 17, 19°30'N, 156°15'W, September 12, 1952. Messenger time: 1732 GCT. Weather: 01, cloud coverage 2. Wind: 030°, 13 kt. Sea: <1 ft. Wire angle: 17°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.31	34.98	22.94		
21	26.06	34.97	23.01		
41	25.89	34.96	23.06		
83	25.16	34.98	23.30		
125	22.10	35.11	24.29		
166	20.58	35.18	24.76		
208	18.17	34.86	25.14		
249	14.28	34.39	25.68		
291	11.41	34.13	26.04		
332	09.72	34.12	26.33		
417	08.15	34.15	26.60		
501	06.66	34.19	26.85		
587	05.98	34.30	27.02		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.31	34.98	22.94	0.000	1.515
10	26.20	34.98	22.97	0.049	1.466
20	26.08	34.97	23.00	0.098	1.417
30	25.99	34.96	23.02	0.147	1.368
50	25.83	34.96	23.07	0.243	1.272
75	25.38	34.97	23.22	0.362	1.153
100	24.97	34.98	23.35	0.478	1.037
150	21.00	35.17	24.64	0.677	0.838
200	18.65	34.93	25.07	0.835	0.680
250	14.20	34.38	25.68	0.968	0.547
300	11.01	34.13	26.11	1.077	0.438
400	08.43	34.14	26.55	1.254	0.261
500	06.68	34.19	26.84	1.396	0.119
600	05.92	34.32	27.04	1.515	0.000

STATION 24

M/V Hugh M. Smith: Cruise 17, 18°46'N, 156°14'W,
September 12, 1952. Messenger time: 2335 GCT.
Weather: 02, cloud coverage 1. Wind: 100°, 15 kt.
Sea: 1-3 ft. Wire angle: 25°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.98	34.99	23.05		
21	25.86	34.98	23.08		
42	25.78	34.98	23.11		
85	23.12	35.07	23.97		
129	21.20	35.16	24.58		
171	19.20	34.99	24.98		
214	17.32	34.76	25.27		
257	14.80	34.51	25.66		
299	12.04	34.20	25.98		
341	09.77	34.14	26.34		
428	07.83	34.18	26.67		
514	06.41	34.22	26.91		
599	05.74	34.31	27.06		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.98	34.99	23.05	0.000	1.464
10	25.95	34.99	23.06	0.048	1.416
20	25.87	34.98	23.08	0.096	1.368
30	25.82	34.98	23.09	0.144	1.320
50	25.67	34.98	23.14	0.240	1.224
75	24.30	35.00	23.57	0.354	1.110
100	22.05	35.14	24.32	0.454	1.010
150	19.92	35.07	24.85	0.624	0.840
200	18.19	34.86	25.13	0.775	0.689
250	15.45	34.57	25.55	0.911	0.553
300	11.98	34.20	25.99	1.026	0.438
400	08.43	34.16	26.57	1.208	0.256
500	06.60	34.22	26.88	1.348	0.116
600	05.72	34.32	27.07	1.464	0.000

STATION 25

M/V Hugh M. Smith: Cruise 17, 18°10'N, 155°33'W,
September 13, 1952. Messenger time: 0742 GCT.
Weather: 03, cloud coverage 9. Wind: 080°, 21 kt.
Sea: 3-5 ft. Wire angle: 35°.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.85	34.95	23.06		
21	25.86	34.95	23.06		
41	25.77	34.97	23.10		
81	23.65	35.20	23.92		
81	23.85	35.20	23.86		
122	21.28	35.21	24.60		
164	20.40	35.26	24.87		
205	18.70	34.96	25.08		
245	14.94	34.42	25.56		
287	12.04	34.16	25.95		
328	10.14	34.16	26.29		
410	07.91	34.14	26.63		
492	06.64	34.22	26.87		
574	05.98	34.29	27.02		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.85	34.95	23.06	0.000	1.458
10	25.85	34.95	23.06	0.048	1.410
20	25.86	34.95	23.06	0.096	1.362
30	25.80	34.96	23.08	0.144	1.314
50	25.71	34.98	23.12	0.240	1.218
75	24.25	35.18	23.72	0.353	1.105
100	22.42	35.20	24.27	0.451	1.007
150	20.70	35.25	24.78	0.625	0.833
200	19.00	35.01	25.04	0.780	0.678
250	14.40	34.36	25.62	0.916	0.542
300	11.27	34.15	26.08	1.027	0.431
400	08.14	34.14	26.59	1.203	0.255
500	06.58	34.23	26.89	1.341	0.117
600	05.82	34.31	27.05	1.458	0.000

STATION 26

M/V Hugh M. Smith: Cruise 17, 18°49'N, 155°32'W,
September 13, 1952. Messenger time: 1340 GCT.
Weather: 02, cloud coverage 7. Wind: 040°, 18 kt.
Sea: 3-5 ft. Wire angle: 20°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.31	35.05	23.30		
22	25.32	35.04	23.29		
45	24.94	35.08	23.44		
90	23.14	35.23	24.09		
135	20.93	35.24	24.71		
180	19.82	35.26	25.03		
226	17.36	34.79	25.28		
271	13.58	34.34	25.78		
315	10.95	34.14	26.14		
363	09.46	34.18	26.42		
454	07.12	34.13	26.74		
547	06.16	34.26	26.97		
639	05.68	34.38	27.12		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	25.31	35.05	23.30	0.000	1.447
10	25.31	35.05	23.30	0.046	1.401
20	25.32	35.04	23.29	0.092	1.355
30	25.30	35.04	23.30	0.138	1.309
50	24.67	35.11	23.54	0.227	1.220
75	23.53	35.21	23.95	0.332	1.115
100	22.90	35.24	24.16	0.429	1.018
150	20.38	35.26	24.87	0.603	0.844
200	19.54	35.24	25.08	0.755	0.692
250	15.92	34.61	25.48	0.894	0.553
300	11.65	34.17	26.03	1.010	0.437
400	08.33	34.16	26.58	1.189	0.258
500	06.59	34.18	26.85	1.329	0.118
600	05.83	34.34	27.07	1.447	0.000

STATION 27

M/V Hugh M. Smith: Cruise 17, 18°46'N, 154°39'W,
September 13, 1952. Messenger time: 2128 GCT.
Weather: 02, cloud coverage 6. Wind: 050°, 14 kt.
Sea: 3-5 ft. Wire angle: 25°. Depth of water: 2900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.29	35.28	23.48		
21	25.18	35.26	23.50		
42	24.98	35.26	23.56		
85	22.10	35.27	24.41		
128	20.54	35.25	24.83		
171	19.62	35.19	25.02		
215	16.72	34.69	25.36		
258	12.91	34.24	25.84		
301	10.52	34.13	26.20		
345	09.00	34.09	26.43		
431	07.70	34.18	26.69		
520	06.30	34.23	26.93		
607	05.88	34.35	27.08		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.29	35.28	23.48	0.000	1.376
10	25.24	35.27	23.49	0.044	1.332
20	25.19	35.26	23.50	0.088	1.288
30	25.08	35.26	23.53	0.132	1.244
50	24.81	35.27	23.62	0.219	1.157
75	22.65	35.27	24.25	0.319	1.057
100	21.52	35.27	24.57	0.408	0.968
150	20.06	35.22	24.93	0.570	0.806
200	18.12	34.93	25.20	0.718	0.658
250	13.42	34.29	25.77	0.846	0.530
300	10.59	34.13	26.19	0.951	0.425
400	08.16	34.14	26.59	1.122	0.254
500	06.54	34.22	26.88	1.260	0.116
600	05.90	34.34	27.06	1.376	0.000

STATION 28

M/V Hugh M. Smith: Cruise 17, 19°30'N, 154°26'W,
September 14, 1952. Messenger time: 0403 GCT.
Weather: 02, cloud coverage 7. Wind: 090°, 13 kt.
Sea: 3-5 ft. Wire angle: not recorded.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.40	35.29	23.46		
22	25.18	35.30	23.53		
45	24.86	35.27	23.61		
91	22.04	35.26	24.42		
136	20.50	35.28	24.86		
181	18.32	34.95	25.17		
228	16.09	34.62	25.45		
273	12.25	34.24	25.97		
318	10.10	34.12	26.27		
364	08.81	34.09	26.45		
455	07.28	34.19	26.76		
546	06.05	34.24	26.97		
639	05.64	34.35	27.10		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.40	35.29	23.45	0.000	1.384
10	25.39	35.30	23.46	0.044	1.340
20	25.21	35.30	23.52	0.088	1.296
30	25.08	35.29	23.55	0.132	1.252
50	24.70	35.26	23.64	0.218	1.166
75	22.80	35.26	24.20	0.319	1.065
100	21.52	35.27	24.57	0.408	0.976
150	20.08	35.25	24.95	0.570	0.814
200	17.25	34.78	25.30	0.712	0.669
250	14.73	34.47	25.64	0.844	0.540
300	10.79	34.16	26.17	0.953	0.431
400	08.23	34.12	26.56	1.126	0.258
500	06.60	34.21	26.87	1.266	0.118
600	05.77	34.30	27.05	1.384	0.000

STATION 29

M/V Hugh M. Smith: Cruise 17, 20°13'N, 154°28'W,
September 14, 1952. Messenger time: 1036 GCT.
Weather: 02, cloud coverage 7. Wind: 090°, 8 kt.
Sea: 1-3 ft. Wire angle: 08°.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.21	35.07	23.35		
24	25.23	35.09	23.36		
48	24.68	35.17	23.58		
95	21.77	35.20	24.45		
144	20.48	35.25	24.84		
192	18.65	34.98	25.11		
240	15.51	34.53	25.52		
288	12.34	34.24	25.95		
337	09.84	34.10	26.30		
384	08.60	34.04	26.45		
482	06.56	34.08	26.78		
579	05.85	34.25	27.00		
677	05.48	34.37	27.14		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	25.21	35.07	23.35	0.000	1.430
10	25.22	35.08	23.35	0.045	1.385
20	25.23	35.09	23.36	0.091	1.339
30	25.23	35.10	23.36	0.136	1.294
50	24.55	35.17	23.62	0.224	1.206
75	23.38	35.19	23.98	0.328	1.102
100	21.52	35.20	24.52	0.420	1.010
150	20.20	35.23	24.90	0.585	0.845
200	18.36	34.94	25.15	0.735	0.695
250	14.78	34.45	25.61	0.868	0.562
300	11.79	34.21	26.03	0.981	0.449
400	08.25	34.04	26.50	1.164	0.266
500	06.37	34.10	26.81	1.310	0.120
600	05.73	34.30	27.05	1.430	0.000

STATION 30

M/V Hugh M. Smith: Cruise 17, 20°54'N, 154°30'W,
September 14, 1952. Messenger time: 1719 GCT.
Weather: 02, cloud coverage 8. Wind: 080°, 16 kt.
Sea: 3-5 ft. Wire angle: 10°. Depth of water: 2900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.27	35.16	23.40		
23	25.26	35.16	23.40		
46	25.17	35.15	23.42		
92	22.04	35.30	24.45		
140	20.74	35.26	24.78		
187	19.46	35.16	25.04		
233	17.40	34.83	25.31		
279	13.24	34.28	25.81		
326	10.90	34.13	26.14		
373	09.30	34.10	26.38		
467	07.16	34.11	26.72		
562	06.16	34.26	26.97		
659	05.64	34.34	27.10		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.27	35.16	23.40	0.000	1.447
10	25.27	35.16	23.40	0.045	1.402
20	25.26	35.16	23.40	0.090	1.357
30	25.24	35.15	23.40	0.135	1.312
50	25.13	35.15	23.43	0.225	1.222
75	23.35	35.25	24.04	0.330	1.117
100	21.83	35.30	24.51	0.422	1.025
150	20.45	35.24	24.84	0.588	0.859
200	19.09	35.11	25.10	0.740	0.707
250	15.80	34.59	25.49	0.878	0.569
300	11.95	34.19	25.98	0.995	0.452
400	08.48	34.10	26.51	1.180	0.267
500	06.74	34.16	26.81	1.325	0.122
600	05.90	34.29	27.02	1.447	0.000

STATION 31

M/V Hugh M. Smith: Cruise 17, 21°44'N, 155°34'W, September 15, 1952. Messenger time: 0328 GCT. Weather: 02, cloud coverage 6. Wind: 080°, 14 kt. Sea: 3-5 ft. Wire angle: 15°.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.09	35.33	23.58		
23	25.00	35.35	23.62		
46	24.95	35.35	23.64		
92	22.22	35.25	24.36		
140	21.12	35.33	24.73		
187	20.60	35.34	24.88		
235	19.23	35.11	25.06		
282	14.70	34.43	25.62		
329	11.68	34.17	26.02		
377	09.74	34.12	26.33		
472	07.60	34.15	26.68		
567	05.96	34.16	26.92		
663	05.36	34.26	27.07		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	25.09	35.33	23.58	0.000	1.494
10	25.05	35.34	23.60	0.043	1.451
20	25.01	35.35	23.62	0.086	1.408
30	24.99	35.35	23.62	0.129	1.365
50	24.93	35.35	23.64	0.214	1.280
75	22.72	35.26	24.23	0.315	1.179
100	22.01	35.25	24.42	0.406	1.088
150	21.05	35.34	24.75	0.576	0.918
200	20.52	35.33	24.89	0.735	0.759
250	18.35	34.98	25.18	0.886	0.608
300	13.42	34.30	25.78	1.015	0.479
400	09.22	34.12	26.41	1.215	0.279
500	07.02	34.15	26.76	1.368	0.126
600	05.68	34.19	26.97	1.494	0.000

STATION 1

M/V Hugh M. Smith: Cruise 20, 23°44'N, 158°02'W, March 9, 1953. Messenger time: first cast 0808 GCT, second cast 1032 GCT. Weather: 02, cloud coverage 2. Wind: 100°, 1 kt. Sea: < 1 ft. Wire angle: first cast 16°, second cast 12°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
04	22.94	35.12	24.06		
14	22.76	35.20	24.17		
27	22.58	35.25	24.26		
51	22.47	35.33	24.36		
97	20.38	35.16	24.80		
193	14.24	34.40	25.69		
284	09.82	34.08	26.28		
382	07.57	34.06	26.62		
477	05.99	34.07	26.84		
577	05.12	34.15	27.01		
796	04.31	34.41	27.31		
988	03.85	34.47	27.40		
1186	03.36	34.44	27.42		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	22.96	35.12	24.05	0.000	1.591
10	22.84	35.18	24.13	0.038	1.553
20	22.67	35.22	24.21	0.076	1.515
30	22.53	35.26	24.28	0.113	1.478
50	22.46	35.33	24.35	0.185	1.406
75	22.45	35.29	24.33	0.276	1.315
100	20.12	35.12	24.84	0.361	1.230
150	16.38	34.67	25.42	0.505	1.086
200	14.17	34.39	25.69	0.629	0.962
250	11.42	34.16	26.06	0.738	0.853
300	09.38	34.07	26.34	0.832	0.759
400	07.17	34.06	26.67	0.991	0.600
500	05.73	34.08	26.88	1.124	0.467
600	04.96	34.18	27.05	1.241	0.350
700	04.54	34.33	27.21	1.341	0.250
800	04.28	34.42	27.31	1.430	0.161
1000	03.81	34.47	27.40	1.591	0.000

STATION 2

M/V Hugh M. Smith: Cruise 20, 24°46'N, 158°02'W, March 9, 1953. Messenger time: first cast 2020 GCT, second cast 2053 GCT. Weather: 03, cloud coverage 2. Wind: 090°, 18 kt. Sea: 3-5 ft. Wire angle: first cast 40°, second cast 53°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	22.80	35.26	24.21		
08	22.72	35.27	24.23		
23	22.74	35.23	24.20		
45	22.60	35.43	24.39		
87	21.90	35.30	24.49		
171	18.54	34.96	25.12		
254	12.82	34.24	25.86		
332	09.74	-	-		
335	09.61	34.08	26.32		
405	08.44	34.07	26.50		
554	06.37	34.12	26.83		
717	04.84	34.11	27.01		
894	03.93	34.32	27.27		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.80	35.26	24.20	0.000	1.764
10	22.71	35.27	24.24	0.037	1.727
20	22.72	35.23	24.20	0.074	1.690
30	22.70	35.26	24.23	0.111	1.653
50	22.47	35.42	24.42	0.184	1.580
75	22.06	35.36	24.49	0.271	1.493
100	21.68	35.27	24.53	0.358	1.406
150	18.97	35.01	25.05	0.518	1.246
200	16.98	34.76	25.35	0.660	1.104
250	14.28	34.41	25.69	0.787	0.977
300	10.74	34.11	26.14	0.895	0.869
400	08.50	34.07	26.48	1.073	0.691
500	07.06	34.12	26.73	1.223	0.541
600	05.84	34.11	26.89	1.355	0.409
700	04.98	34.10	26.98	1.475	0.289
800	04.31	34.21	27.14	1.583	0.181
1000	03.73	34.40	27.35	1.764	0.000

STATION 3

M/V Hugh M. Smith: Cruise 20, 25°54'N, 157°59'W, March 10, 1953. Messenger time: 0716 GCT. Weather: 00, cloud coverage not recorded. Wind: 090°, 30 kt. Sea: 8-12 ft. Wire angle: 20°. Depth of water: 2100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.00	35.36	24.52		
09	21.90	35.22	24.43		
28	21.36	35.31	24.65		
56	20.92	35.38	24.82		
110	19.52	35.17	25.03		
220	15.49	34.52	25.51		
331	11.80	-	-		
436	09.27	34.01	26.32		
547	07.14	33.98	26.62		
653	05.26	34.09	26.95		
871	04.04	34.28	27.23		
1083	03.53	34.30	27.30		
1287	03.16	34.40	27.41		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	21.95	35.36	24.52	0.000	1.795
10	21.88	35.22	24.43	0.035	1.760
20	21.76	35.27	24.50	0.069	1.726
30	21.30	35.32	24.67	0.103	1.692
50	20.99	35.37	24.79	0.168	1.627
75	20.60	35.37	24.90	0.246	1.549
100	19.82	35.23	25.00	0.322	1.473
150	18.30	34.95	25.17	0.468	1.327
200	16.64	34.65	25.34	0.607	1.188
250	13.92	34.31	25.69	0.734	1.061
300	12.60	34.18	25.85	0.849	0.946
400	10.10	34.04	26.20	1.055	0.740
500	08.03	33.99	26.49	1.232	0.563
600	06.06	34.02	26.79	1.380	0.415
700	04.90	34.15	27.03	1.503	0.292
800	04.36	34.24	27.16	1.607	0.188
1000	03.70	34.29	27.27	1.795	0.000

STATION 4

M/V Hugh M. Smith: Cruise 20, 27°00'N, 158°04'W, March 10, 1953. Messenger time: first cast 1817 GCT, second cast 1854 GCT, third cast 1930 GCT. Weather: 61, cloud coverage 10. Wind: 100°, 21 kt. Sea: 8-12 ft. Wire angle: first cast 35°, second cast 40°, third cast not recorded. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.60	35.01	24.63		
08	20.60	34.97	24.60		
23	20.60	35.07	24.67		
46	20.58	35.25	24.81		
92	19.68	35.05	24.90		
185	14.98	34.45	25.57		
278	12.17	34.25	26.00		
366	09.97	34.07	26.25		
462	08.14	33.98	26.47		
550	05.96	33.93	26.73		
778	04.31	34.04	27.01		
966	03.66	34.29	27.28		
1148	03.22	34.38	27.39		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	20.58	35.00	24.62	0.000	1.755
10	20.60	34.97	24.60	0.033	1.722
20	20.60	35.04	24.65	0.067	1.688
30	20.59	35.13	24.72	0.099	1.656
50	20.58	35.24	24.81	0.164	1.591
75	20.52	35.16	24.76	0.243	1.512
100	19.62	35.04	24.91	0.322	1.432
150	16.40	34.61	25.37	0.467	1.288
200	13.97	34.38	25.73	0.592	1.163
250	12.30	34.26	25.98	0.703	1.052
300	11.60	34.18	26.04	0.807	0.948
400	09.37	34.02	26.31	1.001	0.754
500	07.13	33.94	26.59	1.168	0.587
600	05.44	33.93	26.80	1.312	0.443
700	04.70	33.98	26.92	1.439	0.316
800	04.21	34.06	27.04	1.556	0.199
1000	03.62	34.30	27.29	1.755	0.000

STATION 5

M/V Hugh M. Smith: Cruise 20, 28°04'N, 158°02'W, March 11, 1953. Messenger time: first cast 0700 GCT, second cast 1731 GCT. Weather: 00, cloud coverage 10. Wind: 090°, 21 kt. Sea: 8-12 ft. Wire angle: first cast 23°, second cast 33°. Depth of water: 2800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	19.70	35.09	24.93		
13	19.70	35.09	24.93		
31	19.70	35.10	24.93		
65	19.52	35.01	24.91		
131	18.73	34.92	25.04		
263	12.49	34.17	25.87		
370	09.61	34.08	26.32		
502	06.96	34.01	26.67		
625	05.14	33.97	26.86		
759	04.24	34.15	27.11		
1020	03.48	34.34	27.33		
1287	02.96	34.46	27.48		
1560	02.47	34.51	27.56		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	19.68	35.09	24.93	0.000	1.707
10	19.70	35.09	24.92	0.030	1.677
20	19.69	35.09	24.93	0.061	1.646
30	19.69	35.10	24.93	0.091	1.616
50	19.62	35.05	24.91	0.152	1.555
75	19.50	34.99	24.90	0.229	1.478
100	19.57	34.96	24.86	0.307	1.400
150	17.95	34.84	25.18	0.456	1.251
200	15.06	34.45	25.55	0.590	1.117
250	12.84	34.20	25.82	0.708	0.999
300	11.51	34.13	26.02	0.816	0.891
400	08.97	34.07	26.41	1.004	0.703
500	07.00	34.01	26.66	1.162	0.545
600	05.42	33.97	26.83	1.300	0.407
700	04.52	34.07	27.01	1.420	0.287
800	04.06	34.20	27.16	1.525	0.182
1000	03.52	34.33	27.32	1.707	0.000

STATION 6

M/V Hugh M. Smith: Cruise 20, 29°10'N, 158°06'W, March 11, 1953. Messenger time: 1833 GCT. Weather: 01, cloud coverage 3. Wind: 070°, 20 kt. Sea: 8-12 ft. Wire angle: 28°. Depth of water: 3000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	18.80	34.94	25.03		
09	18.88	34.80	24.92		
26	18.89	34.97	25.04		
53	18.88	35.01	25.08		
105	18.05	34.83	25.15		
212	13.76	34.45	25.83		
319	11.40	34.26	26.14		
419	09.42	34.16	26.41		
526	07.31	33.97	26.59		
629	05.47	33.94	26.80		
841	04.24	34.25	27.19		
1050	03.55	34.37	27.35		
1253	03.14	34.45	27.45		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	18.85	34.94	25.03	0.000	1.695
10	18.86	34.80	24.92	0.030	1.665
20	18.87	34.92	25.01	0.060	1.635
30	18.88	34.98	25.05	0.089	1.606
50	18.88	35.01	25.07	0.148	1.547
75	18.88	34.96	25.04	0.221	1.474
100	18.33	34.88	25.11	0.294	1.401
150	16.49	34.64	25.37	0.433	1.262
200	14.01	34.46	25.78	0.556	1.139
250	12.72	34.37	25.97	0.665	1.030
300	11.79	34.29	26.09	0.767	0.928
400	09.81	34.18	26.36	0.955	0.740
500	07.83	34.02	26.55	1.121	0.574
600	05.84	33.93	26.74	1.269	0.426
700	04.97	34.04	26.94	1.398	0.297
800	04.42	34.20	27.12	1.509	0.186
1000	03.70	34.35	27.32	1.695	0.000

STATION 7

M/V Hugh M. Smith: Cruise 20, 29°06'N, 155°02'W, March 13, 1953. Messenger time: 0008 GCT. Weather: 03, cloud coverage 7. Wind: 120°, 14 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 3100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	19.60	35.14	24.98		
09	19.81	35.15	24.94		
24	19.47	35.13	25.02		
52	19.45	35.14	25.03		
104	19.44	35.14	25.03		
211	15.10	34.51	25.59		
317	12.02	34.27	26.04		
426	09.62	34.15	26.37		
532	07.61	34.02	26.58		
638	05.84	34.02	26.82		
844	04.28	34.27	27.20		
1051	03.58	34.42	27.39		
1250	03.16	34.47	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	19.65	35.14	24.97	0.000	1.756
10	19.82	35.15	24.94	0.030	1.726
20	19.53	35.13	25.00	0.060	1.696
30	19.47	35.13	25.01	0.090	1.666
50	19.45	35.14	25.03	0.149	1.607
75	19.45	35.14	25.03	0.223	1.533
100	19.45	35.14	25.03	0.297	1.459
150	19.10	35.10	25.09	0.445	1.311
200	16.50	34.65	25.38	0.585	1.171
250	13.66	34.39	25.80	0.708	1.048
300	12.40	34.29	25.98	0.817	0.939
400	10.18	34.18	26.30	1.013	0.743
500	08.24	34.05	26.51	1.185	0.571
600	06.38	34.01	26.74	1.335	0.421
700	05.20	34.08	26.94	1.465	0.291
800	04.48	34.22	27.13	1.575	0.181
1000	03.67	34.41	27.37	1.756	0.000

STATION 8

M/V Hugh M. Smith: Cruise 20, 28°03'N, 155°02'W, March 13, 1953. Messenger time: 1013 GCT. Weather: 00, cloud coverage not recorded. Wind: 090°, 13 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 3200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.40	35.18	24.80		
09	20.68	35.19	24.74		
28	20.68	35.20	24.75		
57	20.65	35.20	24.76		
114	19.37	35.07	25.00		
228	13.56	34.27	25.73		
327	10.57	34.11	26.18		
432	08.64	34.00	26.41		
542	06.54	34.03	26.74		
627	05.22	34.04	26.91		
833	04.18	34.11	27.08		
1014	03.54	34.17	27.19		
1032	-	-	-		
1180	03.18	34.25	27.29		
1224	-	-	-		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	20.44	35.18	24.80	0.000	1.753
10	20.68	35.19	24.74	0.032	1.721
20	20.68	35.20	24.75	0.064	1.689
30	20.67	35.20	24.75	0.096	1.657
50	20.64	35.20	24.76	0.160	1.593
75	20.63	35.19	24.75	0.241	1.512
100	19.39	35.07	24.99	0.319	1.434
150	18.57	34.91	25.08	0.467	1.286
200	14.88	34.41	25.56	0.603	1.150
250	12.77	34.21	25.84	0.721	1.030
300	11.17	34.13	26.09	0.826	0.927
400	09.21	34.03	26.35	1.015	0.738
500	07.40	34.00	26.60	1.180	0.573
600	05.59	34.04	26.87	1.320	0.433
700	04.70	34.07	26.99	1.441	0.312
800	04.27	34.11	27.07	1.548	0.205
1000	03.58	34.16	27.18	1.753	0.000

STATION 9

M/V Hugh M. Smith: Cruise 20, 26°57'N, 155°01'W, March 13, 1953. Messenger time: first cast 2028 GCT, second cast 2209 GCT. Weather: 02, cloud coverage 8. Wind: 110°, 16 kt. Sea: 5-8 ft. Wire angle: first cast 22°, second cast 24°. Depth of water: 3000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	20.40				
10	20.88				
28	20.71				
56	20.68				
113	19.73				
226	14.40				
340	11.07				
448	08.46				
563	06.26				
671	04.96				
671	05.04				
894	03.90				
1110	03.44				
1319	03.06				

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)

STATION 10

M/V Hugh M. Smith: Cruise 20, 25°54'N, 154°57'W, March 14, 1953. Messenger time: 0913 GCT. Weather: 00, cloud coverage not recorded. Wind: 080°, 15 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 2900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	21.70	35.26	24.52		
09	21.70	35.27	24.52		
24	21.69	35.28	24.54		
52	21.11	35.32	24.72		
105	20.05	35.24	24.95		
210	15.38	34.50	25.52		
315	11.61	34.22	26.07		
426	08.52	34.01	26.44		
533	06.74	34.06	26.74		
641	05.52	34.13	26.95		
851	04.22	34.34	27.26		
1064	03.76	34.44	27.39		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	21.67	35.26	24.53	0.000	1.737
10	21.70	35.27	24.52	0.034	1.703
20	21.69	35.28	24.54	0.068	1.669
30	21.68	35.29	24.55	0.102	1.635
50	21.20	35.32	24.70	0.169	1.568
75	20.68	35.30	24.83	0.250	1.488
100	20.18	35.26	24.93	0.328	1.410
150	18.61	35.03	25.17	0.476	1.261
200	16.40	34.65	25.40	0.615	1.123
250	13.48	34.34	25.80	0.738	0.999
300	12.03	34.24	26.01	0.848	0.890
400	09.15	34.04	26.36	1.040	0.698
500	07.16	34.04	26.66	1.202	0.536
600	05.92	34.10	26.87	1.339	0.398
700	05.00	34.20	27.07	1.457	0.281
800	04.44	34.30	27.20	1.559	0.178
1000	03.84	34.42	27.36	1.737	0.000

STATION 11

M/V Hugh M. Smith: Cruise 20, 24°49'N, 154°58'W, March 14, 1953. Messenger time: 1924 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 16 kt. Sea: 5-8 ft. Wire angle: 09°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	21.80	35.05	24.33		
10	21.82	35.04	24.32		
25	21.83	35.17	24.42		
55	22.09	35.27	24.42		
111	21.50	35.42	24.69		
222	17.48	34.86	25.31		
333	11.52	34.21	26.08		
449	08.24	34.11	26.56		
560	06.14	34.04	26.80		
670	05.01	34.13	27.01		
887	04.27	34.40	27.30		
1102	03.67	34.56	27.49		
1308	03.14	34.52	27.51		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	21.81	35.05	24.33	0.000	1.809
10	21.82	35.04	24.32	0.036	1.773
20	21.82	35.14	24.39	0.072	1.737
30	21.83	35.19	24.43	0.107	1.702
50	21.88	35.25	24.46	0.178	1.632
75	22.12	35.33	24.45	0.265	1.544
100	21.71	35.40	24.62	0.352	1.458
150	20.35	35.28	24.90	0.514	1.295
200	18.65	35.01	25.14	0.666	1.144
250	15.82	34.64	25.53	0.802	1.007
300	12.98	34.31	25.88	0.922	0.888
400	09.45	34.13	26.38	1.120	0.690
500	07.15	34.06	26.68	1.280	0.530
600	05.58	34.04	26.87	1.416	0.394
700	04.92	34.18	27.06	1.534	0.275
800	04.53	34.30	27.19	1.637	0.172
1000	03.95	34.53	27.44	1.809	0.000

STATION 12

M/V Hugh M. Smith: Cruise 20, 23°34'N, 155°02'W, March 15, 1953. Messenger time: first cast 0608 GCT, second cast 0633 GCT. Weather: 02, cloud coverage 5. Wind: 090°, 21 kt. Sea: 5-8 ft. Wire angle: first cast 26°, second cast 32°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.20	35.03	24.20		
09	22.19	35.04	24.22		
23	22.20	35.08	24.24		
51	22.25	35.28	24.38		
101	21.54	35.38	24.65		
188	18.05	34.99	25.27		
282	12.50	34.34	26.00		
382	08.84	34.15	26.50		
478	06.70	34.13	26.80		
574	05.64	34.34 1/	27.10		
765	04.66	34.56 1/	27.39		
959	04.14	34.75 1/	27.59		
1246	03.63	34.49	27.45		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.20	35.03	24.20	0.000	1.690
10	22.19	35.04	24.21	0.037	1.653
20	22.20	35.07	24.23	0.074	1.616
30	22.22	35.13	24.27	0.111	1.579
50	22.25	35.27	24.37	0.184	1.506
75	22.08	35.35	24.48	0.272	1.418
100	21.62	35.38	24.63	0.358	1.332
150	19.44	35.18	25.06	0.515	1.175
200	17.67	34.94	25.32	0.657	1.033
250	14.07	34.49	25.79	0.782	0.908
300	11.82	34.30	26.09	0.889	0.801
400	08.40	34.14	26.55	1.067	0.623
500	06.36	34.16	26.86	1.208	0.482
600	05.46	34.26	27.06	1.322	0.368
700	04.94	34.33	27.18	1.424	0.266
800	04.56	34.38	27.25	1.518	0.172
1000	04.03	34.44	27.37	1.690	0.000

1/ Doubtful salinities not used for interpolated tabulation.

STATION 13

M/V Hugh M. Smith: Cruise 20, 22°34'N, 155°02'W, March 15, 1953. Messenger time: 1537 GCT. Weather: 16, cloud coverage 8. Wind: 070°, 17 kt. Sea: 8-12 ft. Wire angle: 18°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.10	35.02	23.95		
10	23.07	35.03	23.96		
24	23.08	35.02	23.95		
53	22.94	35.31	24.21		
106	21.75	35.37	24.59		
212	16.48	34.70	25.42		
318	10.68	34.30	26.31		
430	07.82	34.09	26.61		
536	05.82	34.26	27.01		
643	05.00	34.26	27.11		
850	04.40	-	-		
1058	03.84	34.31	27.28		
1260	03.32	34.29	27.31		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.08	35.02	23.94	0.000	1.735
10	23.07	35.03	23.95	0.040	1.695
20	23.08	35.02	23.94	0.079	1.656
30	23.12	35.04	23.94	0.119	1.625
50	23.12	35.30	24.14	0.197	1.538
75	22.50	35.36	24.36	0.289	1.446
100	21.86	35.37	24.55	0.377	1.358
150	20.02	35.15	24.88	0.541	1.194
200	17.22	34.78	25.31	0.687	1.048
250	13.99	34.53	25.84	0.812	0.923
300	11.42	34.36	26.22	0.914	0.821
400	08.60	34.11	26.50	1.088	0.647
500	06.34	34.23	26.92	1.229	0.506
600	05.30	34.26	27.07	1.343	0.392
700	04.79	34.27	27.14	1.447	0.288
800	04.51	34.28	27.18	1.546	0.189
1000	04.00	34.30	27.25	1.735	0.000

STATION 14

M/V Hugh M. Smith: Cruise 20, 21°28'N, 154°51'W, March 16, 1953. Messenger time: 0135 GCT. Weather: 01, cloud coverage 6. Wind: 070°, 24 kt. Sea: 12-20 ft. Wire angle: 13°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.00	35.06	24.01		
10	22.94	35.06	24.02		
25	22.95	35.07	24.02		
55	22.51	35.32	24.34		
110	21.00	35.25	24.70		
220	15.52	34.70	25.65		
330	10.33	34.16	26.26		
444	07.46	34.09	26.66		
554	05.74	34.24	27.01		
663	05.06	34.34	27.17		
876	04.17	34.50	27.39		
1091	03.46	34.52	27.48		
1296	03.01	34.58	27.57		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.96	35.06	24.01	0.000	1.674
10	22.94	35.06	24.01	0.039	1.635
20	22.95	35.07	24.02	0.078	1.596
30	22.94	35.10	24.04	0.117	1.557
50	22.60	35.31	24.30	0.192	1.482
75	21.99	35.31	24.47	0.282	1.392
100	21.37	35.28	24.62	0.367	1.307
150	19.23	35.07	25.03	0.526	1.148
200	16.44	34.80	25.51	0.664	1.010
250	14.12	34.54	25.82	0.784	0.890
300	11.62	34.27	26.11	0.890	0.784
400	08.50	34.10	26.51	1.069	0.605
500	06.42	34.15	26.84	1.213	0.461
600	05.40	34.29	27.08	1.330	0.344
700	04.91	34.38	27.21	1.429	0.245
800	04.47	34.46	27.32	1.518	0.156
1000	03.75	34.52	27.45	1.674	0.000

STATION 15

M/V Hugh M. Smith: Cruise 20, 21°02'N, 154°20'W, March 16, 1953. Messenger time: first cast 0907 GCT, second cast 0945 GCT. Weather: 00, cloud coverage not recorded. Wind: 070°, 18 kt. Sea: 8-12 ft. Wire angle: first cast 21°, second cast 26°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.90	35.08	24.04		
09	22.93	35.08	24.04		
28	22.93	35.08	24.04		
56	22.48	35.34	24.36		
112	20.89	35.31	24.78		
225	16.92	34.74	25.35		
337	10.20	34.13	26.26		
446	07.58	34.07	26.63		
559	05.86	34.14	26.91		
667	05.15	34.32	27.14		
893	04.13	34.43	27.34		
1105	03.48	34.51	27.47		
1307	02.97	34.54	27.54		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	22.92	35.08	24.04	0.000	1.740
10	22.93	35.08	24.04	0.039	1.701
20	22.93	35.08	24.04	0.078	1.662
30	22.90	35.08	24.04	0.117	1.623
50	22.67	35.31	24.28	0.192	1.548
75	22.00	35.35	24.50	0.282	1.458
100	21.33	35.34	24.68	0.366	1.373
150	19.42	35.13	25.03	0.524	1.215
200	18.34	34.96	25.18	0.672	1.068
250	15.15	34.55	25.61	0.805	0.935
300	12.02	34.27	26.04	0.918	0.821
400	08.58	34.08	26.48	1.104	0.636
500	06.58	34.10	26.79	1.253	0.487
600	05.50	34.22	27.02	1.376	0.363
700	04.97	34.36	27.20	1.481	0.259
800	04.50	34.41	27.28	1.574	0.166
1000	03.80	34.47	27.41	1.740	0.000

STATION 16

M/V Hugh M. Smith: Cruise 20, 20°35'N, 153°46'W, March 16, 1953. Messenger time: 1755 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 16 kt. Sea: 3-5 ft. Wire angle: 21°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.20	34.69	23.66		
09	23.22	34.69	23.66		
22	23.22	34.67	23.64		
50	23.26	34.82	23.74		
101	22.57	35.19	24.22		
202	18.61	34.92	25.07		
304	11.48	34.05	25.97		
412	07.90	34.01	26.53		
514	06.16	34.08	26.83		
617	05.76	34.25	27.01		
817	04.43	34.39	27.28		
1021	03.96	34.49	27.41		
1216	03.44	34.58	27.53		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.22	34.69	23.66	0.000	1.829
10	23.22	34.69	23.66	0.042	1.787
20	23.22	34.68	23.65	0.085	1.744
30	23.23	34.69	23.65	0.128	1.702
50	23.26	34.82	23.74	0.212	1.617
75	23.27	35.07	23.93	0.315	1.514
100	22.64	35.19	24.20	0.412	1.417
150	20.82	35.14	24.69	0.590	1.239
200	18.67	34.93	25.06	0.748	1.081
250	14.80	34.47	25.63	0.884	0.945
300	11.72	34.16	26.01	0.998	0.832
400	08.28	34.01	26.47	1.184	0.645
500	06.25	34.07	26.81	1.333	0.496
600	05.82	34.23	26.99	1.457	0.372
700	05.17	34.32	27.14	1.566	0.263
800	04.50	34.40	27.28	1.662	0.168
1000	03.99	34.49	27.40	1.829	0.000

STATION 17

M/V Hugh M. Smith: Cruise 20, 19°36'N, 154°14'W, March 17, 1953. Messenger time: 0333 GCT. Weather: 02, cloud coverage 4. Wind: 060°, 18 kt. Sea: 8-12 ft. Wire angle: 00°. Depth of water: 2900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	23.70	34.45	23.34		
10	23.64	34.44	23.35		
26	23.27	34.92	23.82		
57	22.62	35.22	24.23		
113	20.67	35.17	24.73		
226	13.94	34.23	25.62		
338	08.71	34.04	26.43		
455	06.66	34.13	26.80		
568	05.75	34.29	27.04		
681	05.32	34.37	27.16		
900	04.40	34.45	27.33		
1116	03.86	34.51	27.43		
1327	03.36	34.58	27.54		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.70	34.45	23.34	0.000	1.704
10	23.64	34.44	23.35	0.046	1.658
20	23.64	34.58	23.45	0.090	1.613
30	23.15	35.02	23.93	0.133	1.571
50	22.74	35.21	24.19	0.210	1.494
75	22.32	35.24	24.33	0.303	1.401
100	21.30	35.22	24.60	0.390	1.313
150	19.16	34.97	24.98	0.552	1.152
200	16.85	34.61	25.27	0.698	1.006
250	11.54	34.10	25.99	0.820	0.884
300	09.81	34.04	26.25	0.918	0.786
400	07.50	34.08	26.64	1.084	0.619
500	06.22	34.20	26.91	1.220	0.484
600	05.60	34.32	27.09	1.334	0.369
700	05.22	34.38	27.18	1.437	0.267
800	04.78	34.42	27.26	1.532	0.172
1000	04.15	34.48	27.38	1.704	0.000

STATION 18

M/V Hugh M. Smith: Cruise 20, 20°02'N, 154°44'W, March 17, 1953. Messenger time: first cast 1038 GCT, second cast 1059 GCT. Weather: 81, cloud coverage not recorded. Wind: 080°, 14 kt. Sea: 3-5 ft. Wire angle: first cast 15°, second cast 18°. Depth of water: 2900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.20	34.90	23.82		
10	23.16	34.92	23.85		
24	22.79	35.21	24.18		
53	22.14	35.38	24.48		
107	21.28	35.38	24.72		
211	16.68	34.57	25.28		
314	10.90	34.05	26.07		
424	07.62	34.11	26.65		
529	06.25	34.21	26.92		
636	05.53	34.33	27.10		
845	04.39	34.41	27.30		
845	04.52	34.45 1/	27.32		
1054	04.02	34.59 1/	27.48		
1256	03.35	34.54	27.50		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.18	34.90	23.83	0.000	1.713
10	23.16	34.92	23.85	0.041	1.673
20	22.94	35.09	24.04	0.080	1.633
30	22.64	35.27	24.26	0.118	1.595
50	22.22	35.38	24.46	0.190	1.523
75	21.75	35.41	24.62	0.276	1.437
100	21.39	35.40	24.71	0.359	1.354
150	19.47	35.16	25.04	0.516	1.197
200	17.42	34.79	25.27	0.661	1.052
250	13.81	34.31	25.71	0.790	0.924
300	11.53	34.09	25.99	0.902	0.812
400	08.20	34.09	26.55	1.086	0.628
500	06.55	34.19	26.86	1.228	0.485
600	05.72	34.30	27.06	1.346	0.367
700	05.11	34.38	27.19	1.450	0.264
800	04.60	34.43	27.29	1.543	0.171
1000	04.15	34.46	27.36	1.713	0.000

1/ Doubtful salinity not used for interpolated tabulations.

STATION 19

M/V Hugh M. Smith: Cruise 20, 20°30'N, 155°19'W, March 17, 1953. Messenger time: first cast 1808 GCT, second cast 1843 GCT. Weather: 02, cloud coverage 1. Wind: 090°, 15 kt. Sea: 3-5 ft. Wire angle: first cast 31°, second cast 37°. Depth of water: 1400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.80	35.21	24.17		
09	22.81	35.20	24.16		
22	22.83	35.23	24.18		
48	22.82	35.21	24.17		
96	21.80	35.40	24.60		
187	18.32	34.96	25.18		
281	11.45	34.12	26.03		
380	08.92	34.11	26.45		
477	06.82	34.15	26.80		
565	05.55	34.19	26.99		
755	04.75	34.41	27.26		
955	04.33	34.48	27.36		
1156	03.51	34.54	27.49		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.82	35.21	24.17	0.000	1.720
10	22.81	35.20	24.16	0.038	1.682
20	22.82	35.23	24.18	0.075	1.644
30	22.82	35.22	24.17	0.113	1.607
50	22.82	35.21	24.17	0.188	1.531
75	22.51	35.33	24.34	0.281	1.439
100	21.72	35.41	24.63	0.368	1.351
150	20.41	35.26	24.87	0.531	1.188
200	17.81	34.90	25.26	0.680	1.039
250	13.96	34.37	25.73	0.809	0.910
300	10.88	34.11	26.13	0.917	0.802
400	08.45	34.12	26.54	1.095	0.625
500	06.41	34.16	26.86	1.238	0.482
600	05.29	34.23	27.05	1.356	0.363
700	04.87	34.36	27.21	1.459	0.261
800	04.64	34.42	27.28	1.551	0.169
1000	04.15	34.49	27.39	1.720	0.000

STATION 20

M/V Hugh M. Smith: Cruise 20, 21°50'N, 155°26'W, March 18, 1953. Messenger time: first cast 0606 GCT, second cast 0641 GCT. Weather: 02, cloud coverage not recorded. Wind: 070°, 17 kt. Sea: 5-8 ft. Wire angle: first cast 16°, second cast 22°. Depth of water: 2800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.10	35.22	24.09		
10	23.12	35.19	24.06		
24	23.06	35.18	24.07		
53	23.04	35.21	24.10		
106	22.34	35.37	24.42		
215	18.54	35.01	25.16		
324	10.80	34.05	26.09		
437	07.66	34.01	26.57		
544	05.89	34.10	26.88		
653	04.98	34.23	27.09		
858	04.40	34.41	27.30		
1069	03.81	34.47	27.40		
1271	03.24	34.52	27.50		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	23.12	35.22	24.09	0.000	1.820
10	23.12	35.19	24.06	0.038	1.781
20	23.10	35.18	24.06	0.077	1.742
30	23.05	35.18	24.08	0.116	1.704
50	23.04	35.20	24.09	0.193	1.627
75	23.03	35.28	24.16	0.289	1.531
100	22.49	35.37	24.38	0.381	1.438
150	21.17	35.30	24.69	0.555	1.265
200	18.85	35.05	25.12	0.711	1.108
250	16.62	34.77	25.44	0.851	0.969
300	12.15	34.18	25.95	0.970	0.849
400	08.59	34.00	26.42	1.162	0.657
500	06.51	34.05	26.76	1.316	0.504
600	05.29	34.16	27.00	1.442	0.378
700	04.79	34.27	27.14	1.550	0.270
800	04.51	34.37	27.25	1.646	0.173
1000	04.01	34.45	27.37	1.820	0.000

STATION 21

M/V Hugh M. Smith: Cruise 20, 22°16'N, 160°00'W, March 18, 1953. Messenger time: 1354 GCT. Weather: 01, cloud coverage 3. Wind: 090°, 19 kt. Sea: 3-5 ft. Wire angle: 10°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.90	34.92	23.92		
10	22.92	34.93	23.93		
25	22.93	34.93	23.92		
55	22.70	35.36	24.31		
110	21.40	35.31	24.64		
220	15.31	34.49	25.53		
330	10.31	34.07	26.19		
446	07.92	34.13	26.62		
556	05.88	34.18	26.94		
666	05.52	34.35	27.12		
881	04.64	34.43	27.29		
1096	03.86	34.47	27.40		
1301	03.24	34.52	27.50		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	22.92	34.92	23.92	0.000	1.751
10	22.92	34.93	23.92	0.040	1.711
20	22.93	34.93	23.92	0.080	1.671
30	22.93	34.93	23.92	0.120	1.631
50	22.73	35.36	24.31	0.196	1.555
75	22.43	35.36	24.40	0.287	1.465
100	21.70	35.33	24.57	0.374	1.377
150	19.11	35.05	25.05	0.534	1.217
200	16.80	34.72	25.36	0.676	1.075
250	12.91	34.23	25.83	0.800	0.951
300	11.23	34.10	26.05	0.908	0.844
400	08.84	34.09	26.45	1.094	0.658
500	06.75	34.15	26.80	1.244	0.507
600	05.69	34.23	27.01	1.368	0.383
700	05.40	34.38	27.16	1.475	0.276
800	05.00	34.41	27.23	1.573	0.178
1000	04.20	34.45	27.35	1.751	0.000

STATION 22

M/V Hugh M. Smith: Cruise 20, 22°38'N, 156°32'W, March 18, 1953. Messenger time: 2053 GCT. Weather: 02, cloud coverage 1. Wind: 090°, 19 kt. Sea: 5-8 ft. Wire angle: 33°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.30	35.01	23.87		
09	23.31	35.01	23.87		
25	23.32	35.02	23.88		
51	23.31	35.03	23.89		
101	22.05	35.27	24.43		
199	18.40	34.93 1/	25.14		
294	12.68	34.22 1/	25.87		
388	09.38	33.98 1/	26.28		
485	07.10	34.07	26.69		
577	05.98	34.12	26.88		
767	04.74	34.27	27.15		
950	04.14	34.40	27.32		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.32	35.01	23.87	0.000	1.884
10	23.31	35.01	23.87	0.040	1.843
20	23.32	35.02	23.88	0.081	1.803
30	23.32	35.02	23.88	0.121	1.762
50	23.31	35.03	23.89	0.202	1.681
75	23.31	35.08	23.93	0.303	1.581
100	22.13	35.26	24.00	0.403	1.481
150	19.99	35.09	24.85	0.581	1.302
200	18.39	34.94	25.15	0.733	1.150
250	16.20	34.65	25.45	0.872	1.012
300	12.40	34.20	25.86	0.993	0.890
400	09.01	34.00	26.34	1.194	0.690
500	06.88	34.07	26.73	1.353	0.531
600	05.75	34.14	26.94	1.483	0.400
700	05.07	34.22	27.06	1.598	0.285
800	04.60	34.29	27.18	1.703	0.181
1000	04.01	34.43	27.36	1.884	0.000

1/ Salinities corrected for buret misreading; values doubtful but used for interpolated tabulations.

STATION 23

M/V Hugh M. Smith: Cruise 20, 23°08'N, 157°00'W, March 19, 1953. Messenger time: 0412 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 18 kt. Sea: 5-8 ft. Wire angle: 07°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
03	23.30	35.07	23.92		
13	23.26	35.06	23.93		
28	23.26	35.06	23.93		
58	23.18	35.07	23.96		
114	22.24	35.28	24.38		
226	18.62	34.99	25.13		
338	11.16	34.14	26.10		
454	07.70	34.02	26.57		
566	05.85	34.06	26.85		
678	04.94	34.19	27.06		
896	04.30	34.41	27.31		
1113	03.73	34.46	27.41		
1320	03.18	34.51	27.50		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.26	35.07	23.93	0.000	1.913
10	23.26	35.06	23.93	0.040	1.873
20	23.26	35.06	23.93	0.080	1.833
30	23.26	35.06	23.93	0.120	1.793
50	23.20	35.06	23.94	0.200	1.713
75	23.18	35.09	23.97	0.299	1.613
100	22.48	35.26	24.30	0.395	1.518
150	21.43	35.22	24.56	0.574	1.339
200	19.38	35.04	24.97	0.737	1.176
250	17.88	34.88	25.23	0.885	1.028
300	14.38	34.45	25.71	1.016	0.897
400	09.05	34.01	26.36	1.223	0.689
500	06.81	34.01	26.69	1.383	0.530
600	05.45	34.07	26.91	1.517	0.396
700	04.84	34.19	27.06	1.633	0.280
800	04.56	34.34	27.22	1.735	0.178
1000	04.03	34.42	27.35	1.913	0.000

STATION 24

M/V Hugh M. Smith: Cruise 20, 23°38'N, 157°32'W, March 19, 1953. Messenger time: 1100 GCT. Weather: 02, cloud coverage not recorded. Wind: 080°, 18 kt. Sea: 5-8 ft. Wire angle: 21°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.40	35.16	23.96		
09	23.34	35.14	23.96		
23	23.36	35.16	23.97		
51	23.00	35.30	24.18		
103	-	35.41	-		
206	16.76	34.67	25.34		
310	11.23	34.14	26.08		
420	08.11	34.07	26.55		
524	06.25	34.10	26.83		
628	05.08	34.16	27.02		
833	04.40	34.44	27.32		
1039	03.84	34.50	27.43		
1237	03.34	34.52	27.49		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.36	35.16	23.97	0.000	1.768
10	23.35	35.14	23.96	0.040	1.728
20	23.36	35.15	23.96	0.079	1.688
30	23.34	35.19	24.00	0.119	1.649
50	23.01	35.29	24.17	0.196	1.572
75	22.74	35.30	24.26	0.289	1.478
100	21.61	35.25	24.53	0.379	1.389
150	19.80	35.02	24.85	0.545	1.223
200	17.18	34.71	25.27	0.694	1.074
250	14.13	34.39	25.71	0.823	0.945
300	11.68	34.16	26.02	0.934	0.834
400	08.60	34.07	26.47	1.120	0.647
500	06.62	34.08	26.77	1.271	0.496
600	05.32	34.13	26.97	1.398	0.370
700	04.76	34.29	27.16	1.506	0.261
800	04.48	34.40	27.28	1.600	0.167
1000	03.92	34.48	27.40	1.768	0.000

STATION 25A

M/V Hugh M. Smith: Cruise 20, 23°33'N, 159°06'W, March 19, 1953. Messenger time: 2212 GCT. Weather: 16, cloud coverage 4. Wind: 090°, 21 kt. Sea: 5-8 ft. Wire angle: 24°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.70	35.29	24.26		
09	22.70	35.27	24.25		
23	22.68	35.27	24.25		
50	22.65	35.28	24.27		
101	19.90	35.08	24.87		
204	14.84	34.42	25.58		
262	11.56	34.18	26.05		
345	08.80	34.04	26.41		
427	06.83	34.00	26.68		
509	05.90	34.05	26.84		
670	04.74	34.23	27.12		
836	04.29	34.40	27.30		
999	03.88	34.48	27.41		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	22.70	35.29	24.25	0.000	1.655
10	22.70	35.27	24.24	0.037	1.618
20	22.68	35.27	24.25	0.074	1.581
30	22.67	35.27	24.25	0.111	1.544
50	22.65	35.28	24.26	0.184	1.471
75	22.05	35.30	24.45	0.274	1.381
100	19.93	35.08	24.86	0.358	1.297
150	18.00	34.84	25.16	0.507	1.148
200	15.60	34.51	25.48	0.643	1.012
250	12.21	34.22	25.96	0.760	0.895
300	10.26	34.11	26.23	0.859	0.796
400	07.36	34.00	26.60	1.027	0.628
500	05.98	34.04	26.81	1.168	0.487
600	05.15	34.14	26.99	1.290	0.365
700	04.62	34.28	27.16	1.395	0.260
800	04.38	34.37	27.26	1.489	0.166
1000	03.88	34.48	27.40	1.655	0.000

STATION 25

M/V Hugh M. Smith: Cruise 20, 23°07'N, 158°30'W, March 20, 1953. Messenger time: 0539 GCT. Weather: 02, cloud coverage 8. Wind: 090°, 18 kt. Sea: 5-8 ft. Wire angle: 11°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
04	22.50	35.34	24.35		
14	22.51	35.37	24.37		
29	22.52	35.35	24.36		
59	22.24	35.36	24.44		
115	-	35.30	-		
227	14.84	34.46	25.61		
338	09.86	34.10	26.29		
455	07.10	34.03	26.66		
567	05.91	34.13	26.90		
679	04.69	34.25	27.14		
897	03.91	34.42	27.36		
897	03.97	34.42	27.35		
1114	03.52	34.52	27.47		
1320	03.10	34.55	27.54		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	22.52	35.34	24.34	0.000	1.693
10	22.52	35.36	24.36	0.036	1.657
20	22.51	35.36	24.36	0.072	1.621
30	22.52	35.35	24.35	0.107	1.586
50	22.40	35.36	24.39	0.179	1.514
75	21.98	35.35	24.50	0.267	1.426
100	20.42	35.21	24.82	0.350	1.343
150	18.67	34.97	25.10	0.502	1.191
200	16.27	34.62	25.41	0.641	1.052
250	14.27	34.41	25.69	0.766	0.927
300	11.30	34.18	26.10	0.875	0.818
400	08.20	34.04	26.51	1.054	0.639
500	06.62	34.06	26.75	1.203	0.490
600	05.48	34.18	26.99	1.329	0.364
700	04.59	34.26	27.15	1.436	0.257
800	04.18	34.35	27.27	1.529	0.164
1000	03.72	34.48	27.42	1.693	0.000

STATION 26

M/V Hugh M. Smith: Cruise 20, 22°42'N, 157°57'W, March 20, 1953. Messenger time: first cast 1320 GCT, second cast 1420 GCT, third cast 1514 GCT. Weather: 80, cloud coverage not recorded. Wind: 090°, 25 kt. Sea: 8-12 ft. Wire angle: first cast 25°, second cast 28°, third cast 28°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.00	35.31	24.19		
23	22.96	35.33	24.21		
50	22.92	35.34	24.24		
99	22.24	35.34	24.43		
196	17.20	34.78	25.32		
293	12.14	34.16	25.93		
394	08.79	34.05	26.43		
504	06.92	34.09	26.74		
604	05.70	34.14	26.93		
803	04.32	34.34	27.25		
1005	03.73	34.45	27.40		
1208	03.30	34.51	27.49		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	22.98	35.31	24.19	0.000	1.766
10	22.97	35.32	24.20	0.037	1.729
20	22.96	35.33	24.21	0.075	1.691
30	22.95	35.33	24.21	0.112	1.654
50	22.92	35.34	24.23	0.186	1.580
75	22.61	35.34	24.32	0.278	1.488
100	22.23	35.34	24.43	0.368	1.398
150	19.30	35.08	25.02	0.531	1.235
200	17.05	34.76	25.33	0.674	1.092
250	14.19	34.38	25.68	0.801	0.965
300	11.82	34.14	25.97	0.914	0.852
400	08.62	34.05	26.45	1.102	0.664
500	06.98	34.09	26.72	1.255	0.511
600	05.74	34.13	26.91	1.386	0.380
700	04.90	34.23	27.09	1.499	0.267
800	04.34	34.33	27.23	1.597	0.169
1000	03.74	34.45	27.39	1.766	0.000

STATION 27

M/V Hugh M. Smith: Cruise 20, 22°12'N, 157°22'W, March 21, 1953. Messenger time: first cast 0042 GCT, second cast 0121 GCT. Weather: 02, cloud coverage 5. Wind: 100°, 20 kt. Sea: 8-12 ft. Wire angle: first cast 32°, second cast 40°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.10	34.96	23.90		
10	23.07	34.90	23.86		
27	23.04	34.91	23.87		
52	23.01	34.88	23.86		
101	22.89	35.21	24.15		
197	19.50	35.16	25.03		
290	13.18	34.28	25.82		
381	09.20	34.09	26.39		
478	07.22	34.07	26.68		
506	06.84	34.11	26.76		
680	05.44	34.32	27.11		
853	04.84	34.58	27.38		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.08	34.96	23.90	0.000	1.831
10	23.07	34.90	23.85	0.040	1.791
20	23.05	34.91	23.87	0.081	1.750
30	23.04	34.91	23.87	0.121	1.710
50	23.02	34.88	23.85	0.203	1.628
75	22.96	35.04	23.99	0.303	1.528
100	22.90	35.21	24.14	0.400	1.431
150	21.20	35.29	24.67	0.579	1.252
200	19.44	35.15	25.04	0.737	1.094
250	16.35	34.74	25.48	0.876	0.955
300	12.70	34.24	25.88	0.996	0.835
400	08.67	34.08	26.47	1.188	0.643
500	06.94	34.10	26.73	1.340	0.491
600	06.00	34.22	26.95	1.468	0.363
700	05.36	34.34	27.13	1.579	0.252
800	04.98	34.49	27.29	1.674	0.157
1000	04.60	34.70	27.50	1.831	0.000

STATION 28

M/V Hugh M. Smith: Cruise 20, 21°46'N, 156°53'W, March 21, 1953. Messenger time: first cast 0924 GCT, second cast 1002 GCT, third cast 1040 GCT. Weather: 00, cloud coverage 3. Wind: 100°, 23 kt. Sea: 5-8 ft. Wire angle: first cast 40°, second cast 46°, third cast 50°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.00	34.94	23.92		
08	22.98	34.93	23.91		
19	23.00	34.95	23.92		
42	23.02	34.97	23.93		
84	22.69	35.34	24.30		
167	20.25	35.23	24.89		
249	16.98	34.75	25.34		
335	11.58	34.16	26.03		
418	09.14	34.16	26.46		
502	-	-	-		
617	05.71	34.20	26.98		
783	04.70	34.40	27.26		
948	04.04	34.46	27.38		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	22.98	34.94	23.91	0.000	1.847
10	22.99	34.93	23.90	0.040	1.807
20	23.00	34.95	23.91	0.080	1.767
30	23.01	34.96	23.92	0.120	1.727
50	23.04	35.00	23.94	0.200	1.647
75	22.87	35.30	24.21	0.297	1.550
100	22.42	35.34	24.37	0.389	1.458
150	21.00	35.29	24.73	0.560	1.287
200	18.80	35.04	25.12	0.715	1.132
250	16.87	34.73	25.35	0.856	0.991
300	13.32	34.27	25.78	0.981	0.866
400	09.60	34.16	26.38	1.183	0.664
500	07.38	34.15	26.71	1.340	0.507
600	05.90	34.15	26.91	1.472	0.375
700	05.14	34.32	27.14	1.584	0.263
800	04.61	34.40	27.26	1.679	0.168
1000	03.98	34.47	27.38	1.847	0.000

STATION 29

M/V Hugh M. Smith: Cruise 20, 21°22'N, 156°18'W, March 21, 1953. Messenger time: 1956 GCT. Weather: 18, cloud coverage 6. Wind: 110°, 24 kt. Sea: 5-8 ft. Wire angle: 38°. Depth of water: 1100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	22.90	35.12	24.07		
09	22.92	35.12	24.07		
24	22.92	35.13	24.08		
47	22.91	35.13	24.08		
95	22.20	35.37	24.46		
191	18.97	35.10	25.12		
287	12.32	34.15	25.89		
377	09.31	34.12	26.40		
473	07.14	34.11	26.72		
529	05.83	34.11	26.89		
651	05.40	34.32	27.11		
800	04.64	34.41	27.27		
936	04.06	34.46	27.37		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	22.92	35.12	24.06	0.000	1.772
10	22.92	35.12	24.06	0.039	1.733
20	22.92	35.13	24.07	0.077	1.695
30	22.92	35.13	24.07	0.116	1.656
50	22.89	35.14	24.09	0.193	1.579
75	22.72	35.27	24.23	0.287	1.485
100	22.10	35.37	24.49	0.378	1.394
150	20.81	35.32	24.80	0.545	1.227
200	18.80	35.08	25.15	0.697	1.075
250	15.49	34.51	25.50	0.834	0.938
300	11.62	34.13	26.00	0.950	0.822
400	08.82	34.12	26.47	1.135	0.637
500	06.36	34.10	26.81	1.283	0.489
600	05.58	34.23	27.01	1.404	0.368
700	05.18	34.36	27.16	1.510	0.262
800	04.64	34.41	27.27	1.604	0.168
1000	03.96	34.47	27.39	1.772	0.000

STATION 30

M/V Hugh M. Smith: Cruise 20, 20°55'N, 155°44'W, March 22, 1953. Messenger time: 0410 GCT. Weather: 18, cloud coverage 8. Wind: 110°, 18 kt. Sea: 5-8 ft. Wire angle: 12°. Depth of water: 1800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
02	23.40	35.08	23.90		
12	23.40	35.08	23.90		
32	23.00	35.19	24.10		
62	23.06	35.36	24.21		
123	21.30	35.26	24.63		
242	16.70	34.81	25.46		
360	09.57	34.27	26.47		
474	06.73	34.19	26.84		
593	05.38	34.20	27.02		
708	05.04	34.36	27.19		
941	04.19	34.47	27.37		
1173	03.46	34.58	27.53		
1377	02.96	34.56	27.56		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.43	35.08	23.89	0.000	1.757
10	23.40	35.08	23.89	0.040	1.717
20	23.12	35.10	23.99	0.080	1.677
30	23.02	35.17	24.07	0.119	1.638
50	23.02	35.31	24.18	0.195	1.562
75	22.94	35.37	24.25	0.289	1.468
100	22.63	35.37	24.34	0.380	1.377
150	20.62	35.20	24.76	0.552	1.205
200	18.80	35.04	25.12	0.706	1.051
250	16.42	34.78	25.50	0.843	0.914
300	12.40	34.40	26.06	0.958	0.799
400	08.39	34.22	26.62	1.134	0.623
500	06.35	34.19	26.89	1.269	0.488
600	05.33	34.21	27.03	1.387	0.369
700	05.07	34.34	27.17	1.492	0.264
800	04.72	34.41	27.26	1.587	0.169
1000	03.98	34.50	27.41	1.757	0.000

STATION 31

M/V Hugh M. Smith: Cruise 20, 19°47'N, 156°14'W, March 22, 1953. Messenger time: 1458 GCT. Weather: 01, cloud coverage not recorded. Wind: 180°, 07 kt. Sea: < 1 ft. Wire angle: 32°. Depth of water: 2100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.90	35.03	23.72		
08	23.92	34.97	23.66		
21	23.84	35.01	23.72		
46	23.38	35.17	23.97		
90	22.01	35.25	24.42		
173	18.80	35.03	25.11		
254	13.54	34.36	25.81		
340	08.90	34.13	26.47		
423	07.08	34.18	26.78		
506	06.43	34.22	26.90		
652	05.52	34.40	27.16		
816	04.94	34.45	27.27		
975	04.30	34.54	27.41		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.92	35.04	23.72	0.000	1.709
10	23.90	34.97	23.67	0.042	1.667
20	23.87	35.02	23.72	0.084	1.625
30	23.82	35.09	23.78	0.126	1.583
50	23.26	35.20	24.03	0.206	1.503
75	22.46	35.23	24.28	0.302	1.408
100	21.50	35.23	24.55	0.391	1.319
150	19.58	35.11	24.97	0.553	1.156
200	17.37	34.86	25.34	0.698	1.012
250	13.70	34.36	25.77	0.824	0.886
300	10.96	34.16	26.15	0.930	0.779
400	07.38	34.16	26.73	1.097	0.612
500	06.48	34.22	26.90	1.229	0.480
600	05.80	34.33	27.07	1.345	0.364
700	05.30	34.42	27.20	1.448	0.262
800	04.98	34.45	27.27	1.541	0.168
1000	04.21	34.54	27.42	1.709	0.000

STATION 32

M/V Hugh M. Smith: Cruise 20, 20°09'N, 156°37'W, March 22, 1953. Messenger time: first cast 2009 GCT, second cast 2037 GCT, third cast 2117 GCT. Weather: 02, cloud coverage 7. Wind: 060°, 24 kt. Sea: 3-5 ft. Wire angle: first cast 45°, second cast 56°, third cast 59°. Depth of water: 1600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.80	35.05	23.76		
07	23.82	35.07	23.77		
21	23.84	35.05	23.75		
42	23.82	35.07	23.77		
82	22.16	35.32	24.44		
155	18.76	35.05	25.14		
197	17.36	34.81	25.30		
259	12.29	34.27	25.99		
324	09.66	34.13	26.35		
388	08.35	34.16	26.58		
484	06.92	34.18	26.81		
571	05.96	34.23	26.97		
658	05.40	34.34	27.13		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	23.84	35.05	23.75	0.000	1.715
10	23.83	35.06	23.76	0.042	1.674
20	23.84	35.04	23.74	0.083	1.632
30	23.83	35.05	23.75	0.125	1.590
50	23.83	35.08	23.77	0.208	1.507
75	22.32	35.32	24.39	0.305	1.410
100	21.77	35.32	24.55	0.393	1.323
150	18.87	35.06	25.12	0.552	1.164
200	16.95	34.77	25.37	0.692	1.024
250	12.90	34.31	25.90	0.814	0.902
300	10.36	34.14	26.24	0.915	0.801
400	08.14	34.16	26.61	1.084	0.632
500	06.72	34.18	26.83	1.225	0.491
600	05.76	34.24	27.00	1.348	0.368
700	05.27	34.36	27.16	1.456	0.260 1/

1/ Value obtained from adjacent stations.

STATION 33

M/V Hugh M. Smith: Cruise 20, 20°38'N, 157°05'W, March 23, 1953. Messenger time: 0343 GCT. Weather: 03, cloud coverage 7. Wind: 010°, 9 kt. Sea: < 1 ft. Wire angle: 07°. Depth of water: 300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.10	34.94	23.59		
10	24.11	34.92	23.57		
25	24.11	34.95	23.59		
55	24.04	34.98	23.63		
110	23.02	35.30	24.17		
220	17.68	34.87	25.27		
329	09.64	34.21	26.42		
445	07.52	34.19	26.73		
555	06.22	34.22	26.93		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.11	34.94	23.58		
10	24.11	34.92	23.57		
20	24.11	34.98	23.61		
30	24.10	34.95	23.60		
50	24.04	34.97	23.63		
75	24.05	35.06	23.69		
100	23.20	35.28	24.11		
150	20.78	35.15	24.68		
200	18.20	34.92	25.18		
250	14.90	34.62	25.72		
300	10.72	34.26	26.27		
400	08.26	34.19	26.62		
500	06.76	34.20	26.84		
600	06.10	34.22	26.95		

STATION 34

M/V Hugh M. Smith: Cruise 20, 21°05'N, 157°36'W, March 23, 1953. Messenger time: 0956 GCT. Weather: 00, cloud coverage not recorded. Wind: 060°, 22 kt. Sea: 5-8 ft. Wire angle: 00°. Depth of water: 25 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.00				
10	23.96				
25	23.84				

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)

STATION 35

M/V Hugh M. Smith: Cruise 20, 21°20'N, 158°18'W, March 24, 1953. Messenger time: 0514 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 13 kt. Sea: 1-3 ft. Wire angle: 09°. Depth of water: 800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
01	23.86	35.22	23.87		
11	23.85	35.21	23.86		
26	23.48	35.22	23.98		
55	22.78	35.39	24.31		
109	20.88	35.25	24.73		
214	16.40	34.67	25.42		
318	10.97	34.20	26.18		
318	10.91	34.20	26.19		
428	07.77	34.20	26.70		
531	06.57	34.23	26.89		
634	05.70	34.21	26.99		
836	04.84	34.48	27.30		
1043	03.96	34.54	27.45		
1245	03.44	34.56	27.51		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.86	35.22	23.86	0.000	1.736
10	23.85	35.21	23.86	0.040	1.696
20	23.83	35.21	23.87	0.081	1.655
30	23.36	35.24	24.03	0.121	1.615
50	22.86	35.39	24.28	0.196	1.540
75	22.30	35.37	24.43	0.286	1.450
100	21.37	35.30	24.64	0.372	1.364
150	19.80	35.10	24.90	0.534	1.202
200	17.02	34.75	25.33	0.679	1.057
250	14.20	34.43	25.72	0.805	0.931
300	11.70	34.22	26.05	0.915	0.821
400	08.42	34.20	26.60	1.092	0.644
500	06.84	34.22	26.84	1.232	0.504
600	05.92	34.21	26.96	1.355	0.381
700	05.40	34.28	27.07	1.468	0.268
800	05.01	34.43	27.24	1.568	0.168
1000	04.12	34.54	27.42	1.736	0.000

STATION 36

M/V Hugh M. Smith: Cruise 20, 22°01'N, 158°38'W, March 24, 1953. Messenger time: 1240 GCT. Weather: 80, cloud coverage 8. Wind: 080°, 13 kt. Sea: 3-5 ft. Wire angle: 10°. Depth of water: 1600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.30	35.30	24.09		
10	23.32	35.38	24.15		
30	23.22	35.44	24.22		
59	22.82	35.44	24.34		
115	21.74	35.52	24.70		
225	17.64	34.95	25.34		
336	10.26	34.22	26.32		
443	07.96	34.17	26.65		
553	05.86	34.15	26.92		
660	-	34.32	-		
881	-	34.51	-		
1096	03.72	34.56	27.49		
1309	03.22	34.65	27.61		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.32	35.30	24.08	0.000	1.730
10	23.32	35.38	24.14	0.038	1.692
20	23.29	35.42	24.18	0.076	1.654
30	23.22	35.44	24.22	0.113	1.617
50	22.86	35.44	24.32	0.187	1.543
75	22.77	35.45	24.36	0.277	1.453
100	21.96	35.51	24.63	0.364	1.366
150	21.00	35.47	24.87	0.526	1.204
200	18.77	35.12	25.19	0.676	1.054
250	16.20	34.76	25.53	0.811	0.919
300	12.27	34.36	26.05	0.925	0.805
400	08.86	34.18	26.51	1.107	0.623
500	06.70	34.15	26.81	1.252	0.478
600	05.45	34.20	27.01	1.375	0.355
700	04.98	34.36	27.19	1.479	0.251
800	04.60	34.45	27.30	1.570	0.160
1000	03.97	34.53	27.43	1.730	0.000

STATION 37

M/V Hugh M. Smith: Cruise 20, 22°20'N, 159°03'W, March 24, 1953. Messenger time: 1839 GCT. Weather: 03, cloud coverage 4. Wind: 080°, 14 kt. Sea: 3-5 ft. Wire angle: 10°. Depth of water: 1900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.40	35.21	24.01		
10	23.39	35.24	24.02		
26	23.39	35.24	24.02		
54	22.99	35.24	24.14		
108	22.14	35.33	24.45		
212	18.21	34.85	25.12		
315	12.37	34.17	25.90		
424	08.80	34.11	26.47		
528	06.57	34.18	26.85		
633	05.38	34.18	27.00		
837	04.50	34.34	27.23		
1043	03.92	34.57	27.47		
1243	03.36	34.57	27.53		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.38	35.21	24.00	0.000	1.847
10	23.39	35.24	24.02	0.039	1.808
20	23.39	35.24	24.02	0.078	1.769
30	23.39	35.24	24.02	0.117	1.730
50	23.31	35.24	24.04	0.195	1.652
75	22.50	35.26	24.29	0.290	1.557
100	22.44	35.26	24.31	0.381	1.466
150	20.86	35.21	24.71	0.555	1.292
200	18.98	34.95	25.00	0.713	1.134
250	16.20	34.58	25.39	0.856	0.991
300	12.97	34.21	25.80	0.979	0.868
400	09.53	34.11	26.35	1.181	0.666
500	07.07	34.17	26.77	1.336	0.511
600	05.66	34.18	26.96	1.463	0.384
700	04.99	34.22	27.08	1.575	0.272
800	04.62	34.30	27.18	1.677	0.170
1000	04.02	34.55	27.44	1.847	0.000

STATION 37A

M/V Hugh M. Smith: Cruise 20, 22°44'N, 159°38'W, March 25, 1953. Messenger time: 0147 GCT. Weather: 16, cloud coverage 7. Wind: 050°, 16 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.60	35.25	23.97		
10	23.59	35.23	23.96		
24	23.58	35.23	23.96		
52	23.50	35.21	23.97		
104	22.84	35.30	24.23		
203	17.74	34.85	25.24		
302	12.86	34.30	25.90		
408	09.41	34.16	26.41		
508	06.73	34.02	26.71		
609	05.21	34.18	27.02		
809	04.60	34.38	27.25		
1009	03.78	34.50	27.43		
1204	03.25	34.54	27.51		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.60	35.25	23.96	0.000	1.828
10	23.59	35.23	23.95	0.040	1.788
20	23.59	35.23	23.95	0.079	1.749
30	23.56	35.23	23.96	0.119	1.709
50	23.52	35.21	23.96	0.198	1.630
75	23.49	35.25	24.00	0.297	1.531
100	22.90	35.30	24.20	0.394	1.434
150	20.75	35.15	24.69	0.570	1.258
200	17.90	34.87	25.21	0.724	1.104
250	14.90	34.50	25.62	0.856	0.972
300	12.95	34.30	25.88	0.972	0.856
400	09.67	34.17	26.37	1.169	0.659
500	06.90	34.02	26.68	1.328	0.500
600	05.31	34.15	26.98	1.457	0.371
700	04.90	34.29	27.14	1.565	0.263
800	04.63	34.37	27.23	1.661	0.167
1000	03.81	34.50	27.43	1.828	0.000

STATION 38A

M/V Hugh M. Smith: Cruise 20, 22°24'N, 160°13'W, March 25, 1953. Messenger time: 0758 GCT. Weather: 01, cloud coverage 4. Wind: 040°, 17 kt. Sea: 3-5 ft. Wire angle: 35°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.50	35.25	24.00		
09	23.48	35.25	24.00		
25	23.49	35.21	23.97		
49	23.49	35.27	24.02		
95	22.95	35.29	24.19		
184	19.23	35.08	25.04		
274	13.60	34.58	25.96		
362	10.34	34.16	26.26		
455	07.74	34.17	26.68		
546	06.20	34.13	26.86		
736	04.80	34.34	27.20		
925	04.16	34.41	27.32		
1117	03.69	34.47	27.42		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.48	35.25	24.00	0.000	1.793
10	23.48	35.25	24.00	0.039	1.754
20	23.48	35.22	23.98	0.078	1.715
30	23.49	35.21	23.97	0.118	1.675
50	23.49	35.27	24.01	0.197	1.596
75	23.48	35.29	24.03	0.295	1.498
100	22.68	35.29	24.26	0.390	1.403
150	20.20	35.14	24.83	0.562	1.231
200	18.79	35.05	25.13	0.714	1.079
250	15.15	34.73	25.74	0.845	0.948
300	12.44	34.42	26.07	0.954	0.839
400	09.22	34.17	26.45	1.138	0.655
500	06.86	34.14	26.78	1.289	0.504
600	05.65	34.18	26.97	1.414	0.379
700	05.00	34.30	27.14	1.523	0.270
800	04.57	34.37	27.24	1.619	0.174
1000	03.97	34.43	27.35	1.793	0.000

STATION 38

M/V Hugh M. Smith: Cruise 20, 21°30'N, 159°03'W, March 25, 1953. Messenger time: 2005 GCT. Weather: 01, cloud coverage 1. Wind: 080°, 21 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.10	35.30	24.15		
09	23.11	35.31	24.16		
24	23.10	35.29	24.15		
52	22.98	35.36	24.23		
103	21.71	35.42	24.63		
205	17.78	34.84	25.22		
304	11.96	34.23	26.02		
409	08.21	34.13	26.58		
509	06.50	34.19	26.87		
610	05.86	34.30	27.04		
808	04.76	34.45	27.29		
1009	04.03	34.46	27.38		
1208	03.55	34.52	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	23.11	35.30	24.14	0.000	1.742
10	23.11	35.31	24.15	0.038	1.704
20	23.10	35.29	24.14	0.076	1.666
30	23.08	35.30	24.15	0.113	1.629
50	22.98	35.36	24.23	0.188	1.554
75	22.28	35.41	24.46	0.279	1.463
100	21.80	35.42	24.61	0.365	1.377
150	20.48	35.26	24.85	0.528	1.214
200	18.00	34.87	25.19	0.678	1.064
250	15.20	34.53	25.58	0.812	0.930
300	12.17	34.24	25.98	0.926	0.816
400	08.45	34.13	26.54	1.110	0.632
500	06.62	34.18	26.84	1.253	0.489
600	05.91	34.29	27.02	1.373	0.369
700	05.37	34.39	27.17	1.478	0.264
800	04.80	34.44	27.27	1.572	0.170
1000	04.08	34.46	27.37	1.742	0.000

STATION 39

M/V Hugh M. Smith: Cruise 20, 21°03'N, 158°36'W, March 26, 1953. Messenger time: 0340 GCT. Weather: 02, cloud coverage 1. Wind: 090°, 15 kt. Sea: 3-5 ft. Wire angle: 38°. Depth of water: 1500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	23.90	35.10	23.78		
08	23.88	35.13	23.80		
20	23.90	35.15	23.81		
43	23.76	35.20	23.88		
81	21.81	35.32	24.53		
152	19.52	35.11	24.99		
220	16.05	34.71	25.53		
220	15.80	34.71	25.59		
290	11.24	34.34	26.24		
357	09.21	34.23	26.50		
426	07.36	34.17	26.73		
559	06.24	34.30	26.99		
692	05.36	34.37	27.16		
822	04.70	34.49	27.33		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.87	35.10	23.77	0.000	1.685
10	23.88	35.13	23.79	0.041	1.644
20	23.90	35.15	23.80	0.082	1.603
30	23.86	35.17	23.83	0.123	1.562
50	23.60	35.22	23.94	0.204	1.481
75	22.10	35.32	24.45	0.298	1.387
100	21.03	35.27	24.71	0.383	1.302
150	19.60	35.12	24.97	0.541	1.144
200	17.33	34.86	25.34	0.685	1.000
250	13.44	34.49	25.92	0.806	0.879
300	10.97	34.33	26.27	0.905	0.780
400	07.92	34.18	26.66	1.069	0.616
500	06.67	34.25	26.89	1.203	0.482
600	05.99	34.32	27.03	1.321	0.364
700	05.32	34.38	27.16	1.426	0.259
800	04.80	34.46	27.29	1.519	0.166
1000	04.13	34.50	27.39	1.685	0.000

STATION 40

M/V Hugh M. Smith: Cruise 20, 20°35'N, 158°02'W, March 26, 1953. Messenger time: 1139 GCT. Weather: 02, cloud coverage 1. Wind: 060°, 18 kt. Sea: 5-8 ft. Wire angle: 15°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.20	34.88	23.50		
10	24.22	34.86	23.49		
30	23.79	35.15	23.84		
58	23.34	35.30	24.08		
114	21.02	35.19	24.65		
223	13.92	34.42	25.77		
331	09.30	34.19	26.45		
435	07.38	34.14	26.71		
543	06.15	34.26	26.97		
649	05.39	34.35	27.14		
864	04.56	34.47	27.33		
1073	03.86	34.49	27.42		
1277	03.40	34.53	27.49		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.23	34.88	23.50	0.000	1.687
10	24.22	34.86	23.49	0.044	1.643
20	24.11	34.95	23.59	0.088	1.599
30	23.79	35.15	23.83	0.130	1.557
50	23.57	35.26	23.98	0.210	1.477
75	22.80	35.35	24.27	0.306	1.881
100	21.80	35.28	24.50	0.395	1.292
150	19.01	34.95	24.99	0.557	1.130
200	15.66	34.58	25.52	0.696	0.991
250	12.24	34.32	26.03	0.810	0.877
300	10.32	34.23	26.31	0.906	0.781
400	07.92	34.14	26.63	1.069	0.618
500	06.60	34.21	26.87	1.206	0.481
600	05.69	34.31	27.06	1.323	0.364
700	05.18	34.38	27.18	1.426	0.261
800	04.78	34.44	27.27	1.519	0.168
1000	04.06	34.48	27.38	1.687	0.000

STATION 41

M/V Hugh M. Smith: Cruise 20, 20°08'N, 157°32'W, March 26, 1953. Messenger time: 1827 GCT. Weather: 02, cloud coverage 5. Wind: 060° 21 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.20	34.83	23.49		
09	24.16	34.88	23.52		
28	24.18	34.84	23.49		
56	24.02	34.92	23.60		
111	22.66	35.42	24.37		
222	16.36	34.66	25.42		
333	10.17	34.17	26.30		
440	07.70	34.16	26.68		
551	06.27	34.15	26.87		
659	05.47	34.36	27.13		
880	04.53	34.46	27.32		
1095	03.93	34.53	27.44		
1304	03.36	34.59	27.54		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.16	34.83	23.48	0.000	1.824
10	24.16	34.88	23.52	0.044	1.780
20	24.17	34.85	23.49	0.088	1.736
30	24.17	34.84	23.49	0.132	1.692
50	24.07	34.89	23.55	0.220	1.604
75	23.79	35.02	23.73	0.327	1.497
100	23.27	35.38	24.16	0.427	1.397
150	21.62	35.34	24.60	0.607	1.217
200	18.10	34.87	25.16	0.764	1.060
250	14.65	34.49	25.67	0.895	0.929
300	11.80	34.25	26.06	1.006	0.818
400	08.52	34.16	26.55	1.185	0.639
500	06.85	34.15	26.79	1.330	0.494
600	05.90	34.26	27.00	1.454	0.370
700	05.26	34.38	27.17	1.560	0.264
800	04.84	34.43	27.26	1.655	0.169
1000	04.20	34.50	27.38	1.824	0.000

STATION 42

M/V Hugh M. Smith: Cruise 20, 19°36'N, 156°58'W, March 27, 1953. Messenger time: first cast 0136 GCT, second cast 0155 GCT. Weather: 02, cloud coverage 2. Wind: 040°, 4 kt. Sea: 3-5 ft. Wire angle: first cast 12°, second cast 12°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.10	35.01	23.63		
09	23.92	34.96	23.66		
23	23.88	34.98	23.68		
52	23.87	34.98	23.69		
103	23.31	35.23	24.04		
199	16.83	34.73	25.36		
290	10.76	34.15	26.18		
390	07.98	34.05	26.55		
488	06.69	34.20	26.85		
585	05.66	34.33	27.09		
777	04.98	34.38	27.21		
973	04.29	34.49	27.37		
1166	03.56	34.52	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	24.14	35.01	23.62	0.000	1.762
10	23.92	34.96	23.65	0.043	1.719
20	23.90	34.98	23.67	0.085	1.677
30	23.88	34.98	23.68	0.127	1.635
50	23.87	34.98	23.68	0.212	1.550
75	23.90	35.06	23.73	0.318	1.444
100	23.39	35.23	24.01	0.419	1.343
150	20.45	35.14	24.76	0.599	1.163
200	16.80	34.73	25.37	0.747	1.015
250	12.94	34.33	25.90	0.868	0.894
300	10.39	34.14	26.23	0.969	0.793
400	07.80	34.06	26.58	1.138	0.624
500	06.55	34.22	26.88	1.276	0.486
600	05.58	34.34	27.10	1.391	0.371
700	05.18	34.36	27.16	1.492	0.270
800	04.89	34.39	27.22	1.589	0.173
1000	04.20	34.50	27.38	1.762	0.000

STATION 43

M/V Hugh M. Smith: Cruise 20, 19°13'N, 156°31'W, March 27, 1953. Messenger time: 0742 GCT. Weather: 02, cloud coverage 3. Wind: 130°, 12 kt. Sea: 1-3 ft. Wire angle: 18°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.20	34.90	23.52		
09	24.10	34.99	23.62		
24	24.00	35.00	23.66		
51	23.68	35.07	23.81		
101	22.22	35.17	24.30		
198	17.36	34.77	25.27		
295	11.31	34.22	26.13		
396	08.30	34.22	26.64		
493	06.73	34.21	26.86		
590	05.74	34.26	27.02		
784	05.00	34.43	27.25		
981	04.22	34.50	27.39		
1172	03.69	34.52	27.46		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.24	34.90	23.51	0.000	1.748
10	24.09	34.99	23.62	0.043	1.705
20	24.04	35.00	23.65	0.086	1.662
30	23.95	35.01	23.68	0.128	1.620
50	23.73	35.06	23.78	0.212	1.536
75	23.05	35.15	24.05	0.313	1.435
100	22.25	35.17	24.29	0.407	1.341
150	19.90	35.03	24.83	0.579	1.169
200	17.18	34.75	25.29	0.727	1.021
250	12.97	34.33	25.89	0.850	0.898
300	11.18	34.22	26.15	0.953	0.795
400	08.22	34.22	26.64	1.123	0.625
500	06.65	34.22	26.87	1.260	0.488
600	05.68	34.26	27.02	1.378	0.370
700	05.26	34.37	27.16	1.483	0.265
800	04.95	34.44	27.25	1.578	0.170
1000	04.19	34.50	27.39	1.748	0.000

STATION 44

M/V Hugh M. Smith: Cruise 20, 18°50'N, 156°02'W, March 27, 1953. Messenger time: 1513 GCT. Weather: 00, cloud coverage 1, Wind: 080°, 22 kt. Sea: 3-5 ft. Wire angle: 32°. Depth of water: 1400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.70	34.59	23.45		
09	23.66	34.56	23.43		
26	23.68	34.63	23.48		
50	23.67	34.61	23.47		
99	23.72	34.53	23.39		
195	18.98	34.99	25.03		
290	12.50	34.23	25.92		
384	08.20	34.12	26.57		
481	06.80	34.20	26.84		
575	06.10	34.25	26.97		
769	05.18	34.41	27.21		
958	04.44	34.44	27.32		
1141	03.72	34.50	27.44		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.66	34.59	23.45	0.000	1.874
10	23.66	34.56	23.42	0.045	1.829
20	23.67	34.61	23.46	0.089	1.785
30	23.68	34.63	23.47	0.133	1.741
50	23.67	34.61	23.46	0.222	1.652
75	23.70	34.57	23.42	0.334	1.540
100	23.72	34.53	23.38	0.447	1.427
150	20.98	35.12	24.61	0.645	1.229
200	18.73	34.96	25.07	0.804	1.070
250	14.80	34.49	25.64	0.939	0.935
300	11.98	34.20	25.99	1.052	0.822
400	07.90	34.13	26.62	1.231	0.643
500	06.64	34.21	26.86	1.369	0.505
600	05.98	34.26	26.99	1.490	0.384
700	05.47	34.36	27.13	1.599	0.275
800	05.05	34.42	27.23	1.697	0.177
1000	04.28	34.45	27.34	1.874	0.000

STATION 45

M/V Hugh M. Smith: Cruise 20, 17°45'N, 155°27'W, March 28, 1953. Messenger time: 0150 GCT. Weather: 16, cloud coverage 2. Wind: 080°, 22 kt. Sea: 8-12 ft. Wire angle: 18°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	23.60	34.54	23.43		
11	23.61	34.50	23.40		
29	23.60	34.53	23.43		
58	23.58	34.62	23.50		
115	23.02	35.24	24.13		
227	18.54	34.98	25.14		
337	10.04	34.29	26.41		
444	09.26	34.33	26.57		
444	08.86	34.33	26.64		
556	07.16	34.43	26.97		
664	06.20	34.48	27.14		
887	05.04	34.50	27.30		
1101	04.20	34.53	27.41		
1309	03.58	34.59	27.52		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.62	34.54	23.42	0.000	1.848
10	23.61	34.50	23.39	0.045	1.803
20	23.61	34.51	23.40	0.090	1.758
30	23.60	34.53	23.42	0.135	1.713
50	23.59	34.59	23.47	0.224	1.624
75	23.68	34.78	23.59	0.334	1.514
100	23.32	35.17	23.99	0.437	1.411
150	20.86	35.17	24.68	0.620	1.228
200	19.51	35.07	24.96	0.780	1.068
250	16.00	34.72	25.55	0.919	0.929
300	11.75	34.34	26.14	1.031	0.817
400	09.38	34.32	26.54	1.203	0.645
500	08.15	34.38	26.78	1.351	0.497
600	06.72	34.46	27.05	1.471	0.377
700	06.00	34.49	27.17	1.576	0.272
800	05.45	34.50	27.24	1.672	0.176
1000	04.62	34.52	27.35	1.848	0.000

STATION 46

M/V Hugh M. Smith: Cruise 20, 18°04'N, 156°04'W, March 28, 1953. Messenger time: 0813 GCT. Weather: 03, cloud coverage 3. Wind: 080°, 26 kt. Sea: 8-12 ft. Wire angle: 33°. Depth of water 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.50	34.52	23.46		
09	23.44	34.51	23.46		
25	23.46	34.54	23.48		
50	23.46	34.58	23.51		
104	23.40	35.16	23.96		
201	18.75	35.02	25.12		
299	11.08	34.22	26.17		
299	11.21	34.22	26.15		
393	10.18	34.42	26.49		
491	08.32	34.42	26.79		
585	06.96	34.40	26.98		
776	05.46	34.46	27.21		
797	-	-	-		
960	04.47	34.48	27.34		
1137	04.07	34.51	27.41		
1137	04.43	34.51	27.37		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.46	34.52	23.45	0.000	1.852
10	23.44	34.51	23.45	0.044	1.808
20	23.45	34.53	23.46	0.089	1.763
30	23.46	34.55	23.48	0.133	1.719
50	23.46	34.58	23.50	0.221	1.631
75	23.50	34.85	23.69	0.330	1.522
100	23.44	35.05	23.86	0.434	1.418
150	20.70	35.14	24.70	0.618	1.234
200	18.81	35.02	25.10	0.775	1.077
250	15.22	34.68	25.69	0.907	0.945
300	11.12	34.22	26.16	1.015	0.837
400	10.05	34.42	26.51	1.192	0.660
500	08.21	34.42	26.80	1.340	0.512
600	06.82	34.40	26.99	1.465	0.387
700	06.04	34.44	27.12	1.575	0.277
800	05.38	34.46	27.22	1.675	0.177
1000	04.40	34.49	27.36	1.852	0.000

STATION 47

M/V Hugh M. Smith: Cruise 20, 18°34'N, 156°40'W, March 28, 1953. Messenger time: 1522 GCT. Weather: 02, cloud coverage 1. Wind: 080°, 25 kt. Sea: 5-8 ft. Wire angle: 42°. Depth of water: 2000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	23.50	34.42	23.37		
08	23.51	34.41	23.36		
22	23.53	34.40	23.35		
45	23.54	34.42	23.36		
88	23.55	34.41	23.35		
168	18.88	34.91	25.00		
246	12.84	34.21	25.83		
324	09.72	34.33	26.50		
404	08.86	34.37	26.66		
481	07.72	34.36	26.83		
640	06.25	34.39	27.06		
799	05.40	34.45	27.21		
965	04.62	34.46	27.31		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.52	34.42	23.36	0.000	1.810
10	23.52	34.41	23.35	0.045	1.765
20	23.52	34.40	23.34	0.091	1.719
30	23.53	34.41	23.35	0.136	1.674
50	23.54	34.42	23.35	0.227	1.583
75	23.55	34.41	23.34	0.341	1.469
100	23.33	35.10	23.93	0.449	1.361
150	19.82	35.01	24.83	0.628	1.182
200	18.05	34.89	25.19	0.779	1.031
250	12.34	34.21	25.93	0.904	0.906
300	10.30	34.30	26.37	1.001	0.809
400	08.93	34.37	26.65	1.160	0.650
500	07.52	34.36	26.86	1.298	0.512
600	06.55	34.38	27.01	1.419	0.391
700	05.92	34.41	27.11	1.528	0.282
800	05.40	34.45	27.21	1.628	0.182
1000	04.46	34.46	27.32	1.810	0.000

STATION 48

M/V Hugh M. Smith: Cruise 20, 18°59'N, 157°06'W, March 28, 1953. Messenger time: 2206 GCT. Weather: 02, cloud coverage 1. Wind: 100°, 25 kt. Sea: 5-8 ft. Wire angle: 35°. Depth of water: 2100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.00	35.01	23.68		
09	23.93	34.91	23.62		
25	23.94	34.95	23.64		
51	23.94	34.93	23.63		
98	23.72	35.10	23.82		
191	19.22	34.96	24.95		
282	12.67	34.22	25.87		
372	08.91	34.09	26.44		
468	07.56	34.21	26.74		
561	06.58	34.28	26.93		
755	05.30	34.40	27.19		
951	04.34	34.45	27.33		
1151	03.74	34.46	27.40		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.96	35.01	23.68	0.000	1.872
10	23.93	34.91	23.61	0.043	1.829
20	23.94	34.94	23.63	0.085	1.787
30	23.94	34.95	23.64	0.128	1.744
50	23.94	34.93	23.62	0.214	1.658
75	23.88	35.02	23.71	0.320	1.552
100	23.68	35.10	23.83	0.425	1.447
150	22.33	35.15	24.25	0.621	1.251
200	18.55	34.89	25.06	0.788	1.084
250	14.64	34.42	25.62	0.923	0.949
300	11.60	34.16	26.03	1.036	0.836
400	08.41	34.10	26.52	1.218	0.654
500	07.20	34.24	26.81	1.364	0.508
600	06.26	34.30	26.98	1.488	0.384
700	05.60	34.38	27.13	1.597	0.275
800	05.07	34.42	27.22	1.695	0.177
1000	04.18	34.45	27.35	1.872	0.000

STATION 49

M/V Hugh M. Smith: Cruise 20, 19°26'N, 157°38'W, March 29, 1953. Messenger time: 0424 GCT. Weather: 16, cloud coverage 4. Wind: 340°, 13 kt. and variable. Sea: < 1 ft. Wire angle: 00°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.50	34.68	23.27		
10	24.38	34.59	23.24		
30	24.24	34.61	23.30		
61	24.34	34.85	23.45		
120	23.26	35.10	23.96		
234	16.35	34.60	25.38		
347	09.82	34.08	26.28		
457	07.54	34.12	26.67		
570	06.10	34.21	26.94		
682	05.35	34.30	27.10		
907	04.36	34.43	27.32		
1124	03.72	34.44	27.39		
1338	03.23	34.50	27.49		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.50	34.68	23.27	0.000	1.915
10	24.38	34.59	23.23	0.046	1.869
20	24.29	34.60	23.27	0.093	1.822
30	24.24	34.61	23.29	0.139	1.776
50	24.28	34.76	23.39	0.230	1.685
75	24.35	34.94	23.51	0.342	1.573
100	23.82	35.04	23.74	0.449	1.466
150	21.59	35.09	24.42	0.644	1.271
200	19.20	34.89	24.90	0.811	1.104
250	15.00	34.45	25.56	0.952	0.963
300	12.12	34.17	25.94	1.068	0.847
400	08.61	34.09	26.48	1.256	0.659
500	06.94	34.14	26.77	1.405	0.510
600	05.87	34.23	26.98	1.531	0.384
700	05.27	34.31	27.11	1.641	0.274
800	04.80	34.39	27.23	1.739	0.176
1000	04.04	34.43	27.35	1.915	0.000

STATION 50

M/V Hugh M. Smith: Cruise 20, 19°54'N, 158°08'W, March 29, 1953. Messenger time: 1039 GCT. Weather: 01, cloud coverage 4. Wind: 080°, 6 kt. Sea: < 1 ft. Wire angle: 06°. Depth of water: 2000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.40	34.79	23.38		
10	24.42	34.79	23.38		
25	24.39	34.78	23.38		
49	24.28	35.11	23.66		
98	22.28	35.28	24.37		
198	17.24	34.80	25.32		
294	11.67	34.23	26.07		
395	08.43	34.16	26.57		
491	06.92	34.20	26.82		
592	05.88	34.29	27.03		
792	04.96	34.42	27.24		
986	04.21	34.51	27.40		
1190	03.68	34.51	27.45		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	24.40	34.79	23.38	0.000	1.766
10	24.42	34.79	23.37	0.045	1.721
20	24.40	34.78	23.37	0.090	1.676
30	24.38	34.80	23.39	0.135	1.631
50	24.27	35.11	23.66	0.223	1.543
75	23.43	35.21	23.98	0.326	1.440
100	22.10	35.28	24.42	0.420	1.346
150	19.28	35.02	24.98	0.584	1.182
200	17.05	34.78	25.35	0.728	1.038
250	13.50	34.39	25.83	0.851	0.915
300	11.50	34.22	26.09	0.957	0.809
400	08.32	34.16	26.58	1.133	0.633
500	06.82	34.20	26.83	1.274	0.492
600	05.83	34.29	27.03	1.395	0.371
700	05.33	34.37	27.15	1.500	0.266
800	04.91	34.42	27.24	1.596	0.170
1000	04.18	34.51	27.39	1.766	0.000

STATION 51

M/V Hugh M. Smith: Cruise 20, 20°22'N, 158°38'W, March 29, 1953. Messenger time: 1708 GCT. Weather: 01, cloud coverage 3. Wind: 080°, 18 kt. Sea: 3-5 ft. Wire angle: 15°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	23.70	35.21	23.92		
10	23.68	35.21	23.92		
24	23.68	35.22	23.92		
52	23.64	35.23	23.94		
103	21.26	35.16	24.56		
204	15.47	34.57	25.56		
304	11.71	34.22	26.06		
409	08.82	34.14	26.49		
510	06.21	34.23	26.94		
611	05.58	34.33	27.10		
811	04.75	34.43	27.27		
1014	04.05	34.51	27.41		
1213	03.57	34.56	27.50		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	23.68	35.21	23.91	0.000	1.718
10	23.68	35.21	23.91	0.040	1.678
20	23.68	35.22	23.92	0.080	1.638
30	23.68	35.22	23.92	0.120	1.598
50	23.64	35.23	23.94	0.200	1.518
75	22.10	35.23	24.38	0.295	1.423
100	21.32	35.16	24.54	0.382	1.336
150	19.02	34.94	24.98	0.544	1.174
200	15.70	34.59	25.51	0.683	1.035
250	13.40	34.36	25.83	0.802	0.916
300	11.82	34.23	26.04	0.909	0.809
400	09.10	34.14	26.44	1.095	0.623
500	06.40	34.22	26.90	1.239	0.479
600	05.63	34.32	27.08	1.354	0.364
700	05.19	34.38	27.18	1.456	0.262
800	04.80	34.42	27.26	1.550	0.168
1000	04.09	34.50	27.40	1.718	0.000

STATION 52

M/V Hugh M. Smith: Cruise 20, 20°42'N, 159°15'W, March 30, 1953. Messenger time: 0022 GCT. Weather: 02, cloud coverage 3. Wind: 110°, 04 kt. Sea: < 1 ft. Wire angle: 06°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
05	24.06	35.16	23.76		
15	23.74	35.22	23.91		
29	23.69	35.19	23.90		
54	22.72	35.33	24.28		
101	22.26	35.27	24.37		
200	18.26	34.88	25.13		
295	12.30	34.32	26.02		
394	08.68	34.13	26.51		
489	06.86	34.20	26.83		
589	05.93	34.26	27.00		
785	04.89	34.45	27.28		
977	04.16	34.59 1/	27.46		
1178	03.64	34.52	27.46		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.30	35.16	23.69	0.000	1.760
10	23.85	35.20	23.85	0.041	1.719
20	23.69	35.21	23.91	0.082	1.678
30	23.69	35.19	23.89	0.122	1.638
50	22.80	35.33	24.26	0.199	1.561
75	22.51	35.31	24.32	0.291	1.469
100	22.30	35.27	24.35	0.381	1.379
150	21.39	35.18	24.54	0.558	1.202
200	18.25	34.88	25.13	0.717	1.043
250	14.42	34.51	25.73	0.848	0.912
300	12.09	34.30	26.04	0.957	0.803
400	08.53	34.13	26.53	1.139	0.621
500	06.74	34.21	26.85	1.282	0.478
600	05.85	34.27	27.01	1.402	0.358
700	05.24	34.38	27.17	1.508	0.252
800	04.82	34.46	27.28	1.601	0.159
1000	04.06	34.58	27.46	1.760	0.000

1/ Doubtful salinity value.

STATION 53

M/V Hugh M. Smith: Cruise 20, 21°16'N, 159°44'W, March 30, 1953. Messenger time: 0645 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 8 kt. Sea: < 1 ft. Wire angle: 02°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.80	35.27	23.93		
10	23.62	35.32	24.02		
25	23.17	35.34	24.16		
51	22.81	35.36	24.28		
100	21.82	35.38	24.58		
201	18.86	35.08	25.13		
295	13.10	34.34	25.88		
395	09.47	34.14	26.39		
490	07.49	34.22	26.76		
591	06.30	34.25	26.94		
788	04.99	34.39	27.22		
982	04.22	34.45	27.35		
1185	03.58	34.52	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.80	35.27	23.92	0.000	1.798
10	23.62	35.32	24.01	0.039	1.759
20	23.22	35.33	24.14	0.078	1.720
30	23.05	35.35	24.20	0.116	1.682
50	22.82	35.36	24.27	0.190	1.608
75	22.50	35.37	24.37	0.281	1.517
100	21.82	35.38	24.57	0.368	1.430
150	20.79	35.32	24.81	0.533	1.265
200	18.90	35.08	25.12	0.686	1.112
250	15.25	34.59	25.61	0.820	0.978
300	12.90	34.32	25.90	0.936	0.862
400	09.32	34.14	26.41	1.130	0.668
500	07.35	34.22	26.77	1.283	0.515
600	06.23	34.24	26.94	1.411	0.387
700	05.43	34.33	27.11	1.523	0.275
800	04.90	34.39	27.22	1.622	0.176
1000	04.19	34.46	27.35	1.798	0.000

STATION 54

M/V Hugh M. Smith: Cruise 20, 21°44'N, 160°17'W, March 30, 1953. Messenger time: 1300 GCT. Weather: 02, cloud coverage 1. Wind: 080°, 8 kt. Sea: < 1 ft. Wire angle: 11°. Depth of water: 700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.40	35.33	24.10		
10	23.36	35.33	24.10		
24	23.30	35.40	24.17		
49	23.24	35.30	24.11		
96	22.88	35.40	24.29		
193	20.59	35.26	24.82		
285	14.79	34.57	25.71		
381	09.94	34.21	26.37		
474	07.10	34.18	26.78		
572	06.46	34.13	26.83		
763	05.14	34.33	27.15		
954	04.32	34.52	27.38		
1151	03.62	34.55	27.49		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.36	35.33	24.09	0.000	1.865
10	23.36	35.33	24.09	0.038	1.827
20	23.33	35.38	24.14	0.076	1.789
30	23.29	35.39	24.16	0.114	1.751
50	23.23	35.30	24.11	0.190	1.675
75	23.09	35.34	24.18	0.285	1.580
100	22.81	35.40	24.31	0.378	1.487
150	21.70	35.36	24.59	0.555	1.310
200	20.26	35.23	24.88	0.719	1.146
250	18.00	34.96	25.26	0.867	0.998
300	13.90	34.48	25.82	0.994	0.871
400	09.20	34.20	26.48	1.189	0.676
500	06.83	34.16	26.80	1.337	0.528
600	06.28	34.13	26.85	1.468	0.397
700	05.59	34.21	27.00	1.590	0.275
800	04.95	34.39	27.21	1.695	0.170
1000	04.15	34.54	27.42	1.865	0.000

STATION 54A

M/V Hugh M. Smith: Cruise 20, 22°09'N, 160°59'W, March 31, 1953. Messenger time: 0742 GCT. Weather: 02, cloud coverage 2. Wind: calm. Sea: < 1 ft. Wire angle: 21°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.50	35.24	23.70		
10	23.84	35.21	23.87		
24	23.68	35.25	23.95		
46	23.57	35.26	23.99		
92	22.24	35.37	24.45		
185	16.96	34.74	25.34		
273	12.60	34.29	25.94		
364	09.82	34.11	26.31		
453	07.72	34.11	26.64		
548	06.04	34.15	26.90		
734	04.80	34.36	27.21		
918	04.34	34.43	27.32		
1116	03.74	34.44	27.39		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.47	35.24	23.70	0.000	1.746
10	23.84	35.21	23.86	0.041	1.705
20	23.71	35.24	23.92	0.081	1.665
30	23.63	35.25	23.96	0.121	1.625
50	23.52	35.27	24.00	0.200	1.546
75	22.70	35.35	24.30	0.295	1.451
100	22.00	35.36	24.51	0.384	1.362
150	19.80	35.11	24.91	0.548	1.198
200	15.88	34.62	25.50	0.690	1.056
250	13.30	34.35	25.84	0.809	0.937
300	11.74	34.22	26.05	0.916	0.830
400	08.88	34.11	26.46	1.100	0.646
500	06.80	34.12	26.77	1.250	0.496
600	05.57	34.22	27.01	1.375	0.371
700	04.97	34.33	27.16	1.480	0.266
800	04.60	34.40	27.26	1.574	0.172
1000	04.12	34.44	27.35	1.746	0.000

STATION 55A

M/V Hugh M. Smith: Cruise 20, 21°48'N, 161°30'W, March 31, 1953. Messenger time: 1407 GCT. Weather: 02, cloud coverage 2. Wind: 040°, 6 kt. Sea: < 1 ft. Wire angle: 06°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.30	35.11	23.66		
11	24.26	35.16	23.71		
26	24.10	35.15	23.74		
50	24.04	35.15	23.76		
98	23.72 1/	35.29	23.96		
198	18.70	34.98	25.10		
292	11.68	34.24	26.08		
393	08.90	34.11	26.46		
489	07.00	34.07	26.71		
589	05.89	34.15	26.92		
786	04.92	34.38	27.22		
979	04.24	34.45	27.35		
1181	03.62	34.50	27.45		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.28	35.11	23.66	0.000	1.852
10	24.26	35.16	23.70	0.042	1.810
20	24.16	35.15	23.72	0.084	1.768
30	24.06	35.15	23.75	0.126	1.726
50	24.04	35.15	23.76	0.209	1.643
75	23.88	35.24	23.87	0.312	1.540
100	23.67	35.29	23.97	0.413	1.439
150	21.68	35.31	24.56	0.598	1.254
200	18.55	34.97	25.13	0.757	1.095
250	15.42	34.62	25.60	0.891	0.961
300	11.41	34.23	26.12	1.002	0.850
400	08.73	34.10	26.47	1.182	0.670
500	06.82	34.07	26.73	1.334	0.518
600	05.82	34.15	26.92	1.464	0.388
700	05.30	34.30	27.10	1.577	0.275
800	04.85	34.39	27.23	1.676	0.176
1000	04.19	34.46	27.35	1.852	0.000

1/ Temperature doubtful, BT indicates 22.2°C.

STATION 55

M/V Hugh M. Smith: Cruise 20, 21°22'N, 160°56'W, March 31, 1953. Messenger time: 2037 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 14 kt. Sea: 3-5 ft. Wire angle: 07°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.20	35.18	23.73		
10	24.22	35.19	23.74		
26	24.00	35.21	23.82		
55	23.71	35.28	23.96		
109	22.36	35.34	24.39		
215	18.59	35.09	25.21		
319	11.66	34.30	26.13		
427	08.00	34.19	26.66		
532	06.32	34.23	26.93		
636	05.50	34.24	27.04		
842	04.60	34.55 1/	27.38		
1051	04.00	34.46 1/	27.38		
1253	03.40	34.60	27.55		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.24	35.18	23.72	0.000	1.795
10	24.22	35.19	23.74	0.042	1.753
20	24.08	35.20	23.78	0.083	1.712
30	23.95	35.22	23.84	0.124	1.671
50	23.78	35.27	23.93	0.205	1.590
75	23.25	35.33	24.13	0.303	1.492
100	22.62	35.34	24.32	0.396	1.399
150	21.01	35.29	24.73	0.570	1.225
200	19.20	35.14	25.09	0.725	1.070
250	16.45	34.84	25.53	0.862	0.933
300	12.88	34.41	25.97	0.978	0.817
400	08.70	34.19	26.55	1.162	0.633
500	06.72	34.22	26.86	1.304	0.491
600	05.74	34.24	27.00	1.424	0.371
700	05.19	34.29	27.11	1.533	0.262
800	04.75	34.42	27.26	1.630	0.165
1000	04.13	34.54	27.42	1.795	0.000

1/ Possible transposition of values.

STATION 58

R/V Eagle M. Smith: Cruise 20, 20°02'N, 159°22'W, April [illegible], 1965. Messenger time: 1508 GCT. Weather: [illegible], cloud coverage 10. Wind: 080°, 18 kt. Seas: 1-3 ft. [illegible]. Depth at water: 2570 t.

OBSERVED

DEPTH m	T °C	S ‰	σ_t	O_2 ml/l	PO_4-P (µg at/l)
0	24.20	34.69	23.38		
10	24.19	34.68	23.38		
20	24.18	34.67	23.36		
30	24.14	34.72	23.42		
50	24.02	35.21	23.80		
100	20.54	35.13	24.79		
150	14.65	34.63	25.67		
200	12.54	34.54	26.33		
250	11.76	34.51	26.64		
300	10.30	34.45	26.93		
400	8.18	34.38	27.20		
[illegible]	[illegible]	[illegible]	[illegible]		
1000	5.78	34.46	27.40		

INTERPOLATED AND CALCULATED

DEPTH m	T (°C)	S (‰)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
0	24.17	34.69	23.37	0.000	1.896
10	24.16	34.68	23.37	0.045	1.851
20	24.14	34.67	23.36	0.090	1.806
30	24.08	34.68	23.36	0.136	1.760
50	24.04	34.74	23.42	0.226	1.670
75	24.47	35.04	23.55	0.337	1.559
100	22.38	35.24	23.87	0.442	1.454
150	22.10	35.26	24.40	0.634	1.262
200	18.35	34.98	25.06	0.798	1.098
250	16.15	34.82	25.46	0.938	0.958
300	13.18	34.30	25.83	1.059	0.837
400	10.11	34.15	26.47	1.254	0.642
500	07.10	34.22	26.81	1.402	0.494
600	05.91	34.28	27.01	1.525	0.371
700	05.22	34.36	27.16	1.631	0.265
800	04.87	34.42	27.25	1.726	0.170
900	04.15	34.50	27.39	1.896	0.000

STATION 59

M/V Hugh M. Smith: Cruise 20, 19°36'N, 158°52'W, April 1, 1953. Messenger time: 2105 GCT. Weather: 01, cloud coverage 4. Wind: 080°, 16 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 1900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.40	34.90	23.45		
09	24.43	34.89	23.45		
23	24.43	34.88	23.44		
49	24.38	35.07	23.60		
96	23.78	35.28	23.94		
188	19.79	35.11	24.92		
279	14.11	34.46	25.76		
279	14.01	34.46	25.78		
376	09.14	34.18	26.47		
470	07.40	34.20	26.75		
565	06.39	34.29	26.96		
752	05.10	34.40	27.21		
943	04.36	34.52	27.39		
1132	03.84	34.55	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.44	34.90	23.45	0.000	1.853
10	24.43	34.89	23.45	0.044	1.809
20	24.43	34.88	23.44	0.089	1.764
30	24.42	34.90	23.46	0.133	1.720
50	24.36	35.08	23.61	0.221	1.632
75	24.01	35.24	23.84	0.326	1.527
100	23.70	35.29	23.96	0.427	1.426
150	21.65	35.25	24.52	0.614	1.239
200	19.06	35.04	25.05	0.775	1.078
250	15.80	34.65	25.54	0.913	0.940
300	12.96	34.37	25.93	1.030	0.823
400	08.56	34.18	26.56	1.215	0.638
500	07.05	34.22	26.81	1.359	0.494
600	06.11	34.31	27.01	1.481	0.372
700	05.42	34.37	27.14	1.588	0.265
800	04.92	34.43	27.25	1.684	0.169
1000	04.19	34.53	27.41	1.853	0.000

STATION 58

M/V Hugh M. Smith: Cruise 20, 20°02'N, 159°22'W, April 1, 1953. Messenger time: 1508 GCT. Weather: 02, cloud coverage 10. Wind: 080°, 18 kt. Sea: 1-3 ft. Wire angle: 17°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.20	34.69	23.38		
10	24.15	34.68	23.38		
24	24.18	34.67	23.36		
48	24.14	34.73	23.42		
95	24.06	35.21	23.80		
188	20.34	35.13	24.79		
277	14.43	34.43	25.67		
370	09.84	34.14	26.33		
459	07.76	34.19	26.69		
552	06.36	34.25	26.93		
736	05.08	34.38	27.20		
918	04.43	34.50	27.36		
1107	03.78	34.46	27.40		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.17	34.69	23.37	0.000	1.896
10	24.15	34.68	23.37	0.045	1.851
20	24.16	34.67	23.36	0.090	1.806
30	24.18	34.68	23.36	0.136	1.760
50	24.14	34.74	23.42	0.226	1.670
75	24.47	35.04	23.55	0.337	1.559
100	23.90	35.24	23.87	0.442	1.454
150	22.10	35.26	24.40	0.634	1.262
200	18.85	34.98	25.06	0.798	1.098
250	16.05	34.62	25.46	0.938	0.958
300	13.18	34.30	25.83	1.059	0.837
400	09.01	34.15	26.47	1.254	0.642
500	07.10	34.22	26.81	1.402	0.494
600	05.91	34.28	27.01	1.525	0.371
700	05.22	34.36	27.16	1.631	0.265
800	04.87	34.42	27.25	1.726	0.170
1000	04.15	34.50	27.39	1.896	0.000

STATION 59

M/V Hugh M. Smith: Cruise 20, 19°36'N, 158°52'W, April 1, 1953. Messenger time: 2105 GCT. Weather: 01, cloud coverage 4. Wind: 080°, 16 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 1900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.40	34.90	23.45		
09	24.43	34.89	23.45		
23	24.43	34.88	23.44		
49	24.38	35.07	23.60		
96	23.78	35.28	23.94		
188	19.79	35.11	24.92		
279	14.11	34.46	25.76		
279	14.01	34.46	25.78		
376	09.14	34.18	26.47		
470	07.40	34.20	26.75		
565	06.39	34.29	26.96		
752	05.10	34.40	27.21		
943	04.36	34.52	27.39		
1132	03.84	34.55	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	24.44	34.90	23.45	0.000	1.853
10	24.43	34.89	23.45	0.044	1.809
20	24.43	34.88	23.44	0.089	1.764
30	24.42	34.90	23.46	0.133	1.720
50	24.36	35.08	23.61	0.221	1.632
75	24.01	35.24	23.84	0.326	1.527
100	23.70	35.29	23.96	0.427	1.426
150	21.65	35.25	24.52	0.614	1.239
200	19.06	35.04	25.05	0.775	1.078
250	15.80	34.65	25.54	0.913	0.940
300	12.96	34.37	25.93	1.030	0.823
400	08.56	34.18	26.56	1.215	0.638
500	07.05	34.22	26.81	1.359	0.494
600	06.11	34.31	27.01	1.481	0.372
700	05.42	34.37	27.14	1.588	0.265
800	04.92	34.43	27.25	1.684	0.169
1000	04.19	34.53	27.41	1.853	0.000

STATION 60

M/V Hugh M. Smith: Cruise 20, 19°09'N, 158°22'W, April 2, 1953. Messenger time: 0307 GCT. Weather: 18, cloud coverage 9. Wind: 120°, 9 kt. Sea: 1-3 ft. Wire angle: 05°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.50	34.78	23.33		
10	24.47	34.79	23.36		
25	24.36	34.86	23.45		
55	24.38	34.97	23.53		
109	23.28	35.31	24.11		
213	18.42	34.96	25.15		
317	11.40	34.26	26.14		
425	08.08	34.23	26.68		
529	06.21	34.27	26.97		
633	05.67	34.36	27.12		
839	04.71	34.48	27.32		
1048	03.98	34.52	27.43		
1252	03.46	34.52	27.48		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	24.54	34.78	23.33	0.000	1.827
10	24.47	34.79	23.36	0.045	1.782
20	24.39	34.84	23.42	0.090	1.737
30	24.37	34.88	23.46	0.135	1.692
50	24.37	34.95	23.51	0.224	1.603
75	24.10	35.14	23.73	0.331	1.496
100	23.50	35.30	24.03	0.433	1.394
150	21.52	35.23	24.54	0.617	1.210
200	19.20	35.04	25.01	0.779	1.048
250	15.65	34.66	25.58	0.916	0.911
300	12.40	34.33	26.01	1.031	0.796
400	08.70	34.23	26.58	1.211	0.616
500	06.62	34.25	26.90	1.350	0.477
600	05.82	34.33	27.06	1.465	0.362
700	05.38	34.41	27.18	1.568	0.259
800	04.90	34.46	27.28	1.661	0.166
1000	04.15	34.52	27.41	1.827	0.000

STATION 61

M/V Hugh M. Smith: Cruise 20, 18°42'N, 157°53'W, April 2, 1953. Messenger time: 0920 GCT. Weather: 02, cloud coverage 7. Wind: 120°, 14 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 1800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	24.10	34.83	23.49		
10	24.13	34.83	23.50		
25	24.15	34.83	23.49		
53	23.94	34.95	23.64		
103	23.74	35.07	23.79		
200	18.94	34.97	25.03		
299	11.01	34.21	26.18		
403	09.14	34.38	26.63		
503	07.58	34.33	26.83		
604	06.62	34.36	26.99		
805	05.16	34.44	27.23		
1007	04.26	34.50	27.38		
1201	03.65	34.53	27.47		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.14	34.83	23.49	0.000	1.874
10	24.13	34.83	23.49	0.044	1.830
20	24.14	34.83	23.49	0.088	1.786
30	24.15	34.84	23.49	0.132	1.742
50	23.98	34.94	23.62	0.219	1.655
75	23.85	35.02	23.72	0.326	1.548
100	23.79	35.07	23.77	0.431	1.443
150	22.70	35.16	24.16	0.630	1.244
200	18.96	34.97	25.02	0.801	1.073
250	15.80	34.64	25.53	0.940	0.934
300	11.00	34.21	26.18	1.051	0.823
400	09.21	34.38	26.61	1.222	0.652
500	07.62	34.33	26.82	1.363	0.511
600	06.69	34.35	26.97	1.488	0.386
700	05.90	34.40	27.11	1.599	0.275
800	05.20	34.44	27.22	1.699	0.175
1000	04.30	34.50	27.37	1.874	0.000

STATION 62

M/V Hugh M. Smith: Cruise 20, 18°18'N, 157°25'W, April 2, 1953. Messenger time: 1539 GCT. Weather: 01, cloud coverage 9. Wind: 080°, 23 kt. Sea: 5-8 ft. Wire angle: 30°. Depth of water: 900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.60	34.52	23.42		
09	23.60	34.49	23.39		
22	23.60	34.52	23.42		
48	23.60	34.49	23.39		
94	22.55	34.97	24.06		
183	18.00	34.80	25.14		
269	11.30	34.19	26.11		
363	09.14	34.38	26.63		
453	07.90	34.39	26.83		
546	07.29	34.51 1/	27.01		
736	05.98	34.57 1/	27.24		
932	04.83	34.40 1/	27.24		
1127	04.18	34.52	27.41		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	23.58	34.52	23.42	0.000	1.799
10	23.60	34.49	23.39	0.045	1.754
20	23.60	34.52	23.41	0.090	1.709
30	23.60	34.52	23.41	0.135	1.664
50	23.60	34.49	23.39	0.225	1.574
75	23.53	34.81	23.65	0.335	1.464
100	22.44	34.97	24.09	0.436	1.363
150	19.35	34.89	24.86	0.612	1.187
200	17.38	34.74	25.24	0.760	1.039
250	12.58	34.25	25.91	0.884	0.915
300	10.44	34.26	26.31	0.983	0.816
400	08.59	34.38	26.71	1.142	0.657
500	07.59	34.38	26.87	1.274	0.525
600	06.93	34.38	26.96	1.398	0.401
700	06.24	34.41	27.08	1.513	0.286
800	05.56	34.46	27.20	1.617	0.182
1000	04.58	34.51	27.36	1.799	0.000

1/ Salinities doubtful, not used for interpolated tabulations.

STATION 63

M/V Hugh M. Smith: Cruise 20, 17°44'N, 156°50'W, April 3, 1953. Messenger time: 0027 GCT. Weather: 18, cloud coverage 7. Wind: 090°, 15 kt. Sea: 5-8 ft. Wire angle: 25°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.80	34.47	23.33		
09	23.78	34.46	23.32		
23	23.75	34.45	23.32		
50	23.70	34.44	23.33		
100	23.33	35.14	23.96		
192	19.40	35.05	24.97		
287	11.05	34.19	26.16		
385	08.92	34.35	26.64		
480	07.92	34.42	26.85		
576	06.64	34.42	27.03		
767	05.45	34.51	27.26		
961	04.54	34.51	27.36		
1150	03.92	34.52	27.43		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	23.78	34.47	23.32	0.000	1.825
10	23.78	34.46	23.31	0.046	1.779
20	23.77	34.45	23.31	0.091	1.734
30	23.74	34.45	23.32	0.137	1.688
50	23.70	34.44	23.32	0.229	1.596
75	23.70	34.82	23.61	0.340	1.485
100	23.35	35.14	23.95	0.444	1.381
150	21.40	35.13	24.50	0.631	1.194
200	19.00	35.02	25.05	0.793	1.032
250	15.50	34.62	25.58	0.930	0.895
300	10.66	34.20	26.23	1.038	0.787
400	08.78	34.36	26.67	1.204	0.621
500	07.64	34.42	26.89	1.339	0.486
600	06.44	34.43	27.06	1.456	0.369
700	05.83	34.48	27.18	1.560	0.265
800	05.28	34.51	27.27	1.654	0.171
1000	04.40	34.51	27.37	1.825	0.000

STATION 64

M/V Hugh M. Smith: Cruise 20, 17°19'N, 156°19'W, April 3, 1953. Messenger time: 0733 GCT. Weather: 00, cloud coverage 0. Wind: 090°, 18 kt. Sea: 3-5 ft. Wire angle: 26°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	23.50	34.61	23.50		
09	23.53	34.62	23.52		
22	23.55	34.60	23.49		
49	23.55	34.62	23.51		
97	23.55	35.02	23.81		
188	19.73	35.10	24.93		
277	12.12	34.26	26.01		
370	09.07	34.39	26.65		
460	08.05	34.48	26.88		
552	07.04	34.43	26.99		
737	05.62	34.46	27.19		
930	04.74	34.51	27.34		
1122	04.16	34.57	27.45		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	23.54	34.61	23.50	0.000	1.817
10	23.53	34.62	23.51	0.044	1.773
20	23.54	34.60	23.49	0.088	1.729
30	23.55	34.60	23.49	0.132	1.685
50	23.55	34.62	23.50	0.220	1.597
75	23.55	34.80	23.64	0.329	1.488
100	23.54	35.03	23.82	0.434	1.383
150	20.98	35.13	24.61	0.622	1.195
200	19.22	35.07	25.03	0.782	1.035
250	15.75	34.64	25.54	0.920	0.897
300	11.07	34.24	26.19	1.030	0.787
400	08.64	34.44	26.75	1.194	0.623
500	07.64	34.46	26.92	1.324	0.493
600	06.59	34.43	27.04	1.440	0.377
700	05.84	34.45	27.15	1.546	0.271
800	05.30	34.47	27.24	1.643	0.174
1000	04.53	34.54	27.38	1.817	0.000

STATION 1

M/V Hugh M. Smith: Cruise 21, 20°33'N, 157°30'W, August 5, 1953. Messenger time: 0811 GCT. Weather: 02, cloud coverage not recorded. Wind: 080°, 13 kt. Sea: 1-3 ft. Wire angle: 00°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.37	34.88	23.16		0.21
43	25.10	34.90	23.26		0.18
96	25.00	34.91	23.29		0.14
117	23.64	35.01	23.77		0.25
148	21.78	35.14	24.40		0.16
180	20.34	35.09	24.76		0.20
212	18.66	34.94	25.08		0.32
244	18.10	34.83	25.14		0.40
276	15.83	34.49	25.41		0.58
318	13.36	34.21	25.73		0.81
370	10.12	34.10	26.25		1.20
422	08.77	34.12	26.49		1.58
524	06.89	34.13	26.77		2.21

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	25.37	34.88	23.16	0.000	1.481
10	25.30	34.89	23.19	0.047	1.434
20	25.17	34.89	23.23	0.094	1.387
30	25.11	34.90	23.25	0.140	1.341
50	25.09	34.90	23.26	0.233	1.248
75	25.05	34.91	23.28	0.349	1.132
100	24.98	34.91	23.30	0.465	1.016
150	21.60	35.14	24.46	0.669	0.812
200	19.22	35.01	24.99	0.834	0.647
250	17.34	34.71	25.23	0.981	0.500
300	14.49	34.33	25.59	1.114	0.367
400	09.31	34.11	26.39	1.325	0.156
500	07.20	34.13	26.73	1.481	0.000

STATION 2

M/V Hugh M. Smith: Cruise 21, 21°10'N, 157°30'W, August 5, 1953. Messenger time: 1357 GCT. Weather: 00, cloud coverage not recorded. Wind: 060°, 22 kt. Sea: 3-5 ft. Wire angle: 10°. Depth of water: 300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.19	34.94	23.26		0.22
19	25.18	34.88	23.22		0.18
40	25.18	34.96	23.28		0.17
60	25.08	35.01	23.34		0.18
80	24.70	35.06	23.50		0.19
110	23.44	35.12	23.92		0.23
140	22.30	35.22	24.32		0.23
181	20.41	35.16	24.79		0.22

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.19	34.94			
10	25.19	34.91			
20	25.18	34.88			
30	25.18	34.92			
50	25.16	34.98			
75	24.73	35.06			
100	23.72	35.10			
150	22.02	35.22			

STATION 3

M/V Hugh M. Smith: Cruise 21, 21°25'N, 157°32'W, August 5, 1953. Messenger time: 1732 GCT. Weather: 02, cloud coverage 2. Wind: 070°, 13 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	24.77	34.98	23.42		0.27
33	24.74	35.05	23.48		0.26
58	24.76	35.00	23.43		0.27
90	24.34	35.18	23.70		0.23
118	23.10	35.26	24.12		0.23
167	21.52	35.38	24.66		0.25
190	20.16	35.23	24.91		0.26
223	18.12	35.00	25.26		0.40
223	18.18	35.00	25.25		-
271	15.50	34.63	25.60		0.57
304	13.36	34.36	25.84		0.96
352	10.88	34.23	26.22		1.33
402	09.08	34.20	26.50		1.64
510	07.06	34.16	26.77		2.18

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.77	34.98	23.42	0.000	1.401
10	24.76	35.00	23.44	0.045	1.356
20	24.75	35.02	23.45	0.089	1.312
30	24.74	35.05	23.48	0.134	1.267
50	24.75	35.01	23.45	0.223	1.178
75	24.73	35.05	23.48	0.334	1.067
100	24.05	35.21	23.81	0.441	0.960
150	21.94	35.37	24.54	0.632	0.769
200	19.66	35.19	25.01	0.794	0.607
250	16.31	34.77	25.52	0.933	0.468
300	13.65	34.38	25.80	1.054	0.347
400	09.20	34.20	26.48	1.250	0.151
500	07.20	34.16	26.75	1.401	0.000

STATION 4

M/V Hugh M. Smith: Cruise 21, 21°52'N, 157°33'W, August 5, 1953. Messenger time: 2157 GCT. Weather: 02, cloud coverage 3. Wind: 090°, 16 kt. Sea: 1-3 ft. Wire angle: 14°. Depth of water: 1700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.12	35.11	23.41		0.20
31	25.01	35.14	23.46		0.18
62	25.00	35.09	23.43		0.19
84	23.99	35.14	23.77		0.12
104	23.30	35.26	24.06		0.14
122	22.44	35.42	24.43		0.20
165	21.46	35.46	24.73		0.16
206	20.11	35.31	24.99		0.21
257	18.24	35.06	25.27		0.30
308	13.91	34.50	25.84		0.72
359	11.94	34.37	26.13		0.93
410	09.50	34.28	26.49		1.37
512	07.42	34.33	26.85		1.94

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.12	35.11	23.41	0.000	1.407
10	25.05	35.12	23.44	0.045	1.362
20	25.02	35.13	23.45	0.089	1.318
30	25.01	35.14	23.46	0.134	1.273
50	25.00	35.11	23.45	0.223	1.184
75	24.60	35.11	23.57	0.333	1.074
100	23.42	35.23	24.01	0.437	0.970
150	21.81	35.47	24.65	0.620	0.787
200	20.28	35.35	24.97	0.780	0.627
250	18.59	35.12	25.24	0.928	0.479
300	14.38	34.55	25.78	1.056	0.351
400	10.00	34.30	26.43	1.256	0.151
500	07.55	34.33	26.83	1.407	0.000

STATION 5

M/V Hugh M. Smith: Cruise 21, 23°36'N, 157°31'W, August 6, 1953. Messenger time: 1132 GCT. Weather: 80, cloud coverage 4. Wind: 100°, 19 kt. Sea: 3-5 ft. Wire angle: 15°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.95	34.78	23.21		0.25
31	24.96	34.85	23.26		0.23
62	24.92	34.88	23.30		0.23
83	23.66	35.00	23.76		0.23
103	22.88	35.10	24.07		0.23
134	22.05	35.25	24.41		0.21
175	20.66	35.26	24.80		0.26
206	19.55	35.12	24.99		0.31
256	17.42	34.89	25.35		0.38
309	13.26	34.38	25.88		0.75
360	11.36	34.33	26.21		0.96
412	10.02	34.28	26.41		1.17
516	07.61	34.18	26.71		1.62

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.95	34.78	23.21	0.000	1.429
10	24.95	34.80	23.23	0.047	1.382
20	24.96	34.83	23.25	0.093	1.336
30	24.96	34.85	23.26	0.140	1.289
50	24.94	34.87	23.28	0.232	1.197
75	23.98	34.97	23.65	0.344	1.085
100	23.00	35.09	24.02	0.446	0.983
150	21.61	35.31	24.58	0.630	0.799
200	19.74	35.15	24.96	0.793	0.636
250	17.73	34.92	25.30	0.939	0.490
300	13.70	34.41	25.81	1.065	0.364
400	10.39	34.28	26.34	1.267	0.162
500	07.85	34.18	26.67	1.429	0.000

STATION 6

M/V Hugh M. Smith: Cruise 21, 23°13'N, 156°60'W, August 6, 1953. Messenger time: 1807 GCT. Weather: 15, cloud coverage 2. Wind: 100, 21 kt. Sea: 5-8 ft. Wire angle: 05°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.06	35.07	23.40		0.13
26	25.20	35.39	23.59		0.07
63	24.80	35.50	23.80		0.04
88	23.16	35.39	24.20		0.02
115	22.38	35.41	24.44		0.08
150	21.11	35.39	24.78		0.12
187	19.71	35.25	25.05		0.19
228	18.38	35.00	25.20		0.24
284	14.80	34.51	25.66		0.47
340	12.46	34.32	25.99		0.71
397	10.20	34.20	26.31		1.02
452	08.68	34.17	26.54		1.31
557	06.92	34.16	26.79		1.75

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.06	35.07	23.40	0.000	1.377
10	25.07	35.10	23.42	0.045	1.332
20	25.09	35.15	23.45	0.090	1.287
30	25.20	35.40	23.60	0.133	1.244
50	25.12	35.47	23.68	0.219	1.158
75	23.45	35.39	24.12	0.320	1.057
100	22.78	35.40	24.32	0.414	0.963
150	21.11	35.39	24.78	0.586	0.791
200	19.35	35.18	25.09	0.740	0.637
250	17.08	34.79	25.35	0.882	0.495
300	14.15	34.45	25.75	1.008	0.369
400	10.11	34.19	26.32	1.215	0.162
500	07.70	34.16	26.68	1.377	0.000

STATION 7

M/V Hugh M. Smith: Cruise 21, 22°43'N, 156°24'W, August 7, 1953. Messenger time: 0050 GCT. Weather: 25, cloud coverage 7. Wind: 100°, 21 kt. Sea: 3-5 ft. Wire angle: 15°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.23	35.11	23.37		0.18
28	25.12	35.12	23.41		0.16
53	25.10	35.10	23.41		0.17
75	23.84	35.24	23.89		0.17
96	22.98	35.33	24.21		0.10
127	21.74	35.35	24.57		0.13
158	21.00	35.30	24.74		0.12
212	19.16	35.10	25.08		0.16
265	16.60	34.73	25.42		0.35
318	13.28	34.35	25.85		0.59
372	10.76	34.15	26.18		1.00
426	09.38	34.11	26.38		1.30
531	07.34	34.07	26.66		1.79

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.23	35.11	23.38	0.000	1.413
10	25.18	35.11	23.39	0.045	1.368
20	25.13	35.12	23.41	0.090	1.323
30	25.11	35.12	23.42	0.135	1.278
50	25.10	35.10	23.41	0.225	1.188
75	23.84	35.24	23.89	0.332	1.081
100	22.80	35.35	24.28	0.429	0.984
150	21.17	35.32	24.71	0.603	0.810
200	19.59	35.15	25.00	0.762	0.651
250	17.38	34.84	25.32	0.906	0.507
300	14.49	34.47	25.69	1.035	0.378
400	10.00	34.12	26.29	1.245	0.168
500	07.84	34.08	26.60	1.413	0.000

STATION 8

M/V Hugh M. Smith: Cruise 21, 22°17'N, 155°52'W, August 7, 1953. Messenger time: 0737 GCT. Weather: 25, cloud coverage not recorded. Wind: 100°, 29 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.18	35.27	23.51		0.09
32	25.09	35.33	23.58		0.08
62	23.93	35.32	23.93		0.05
79	23.23	35.33	24.14		0.05
102	22.32	35.40	24.45		0.05
127	21.42	35.36	24.67		0.07
150	20.55	35.26	24.83		0.14
201	19.20	35.11	25.07		0.25
251	16.57	34.76	25.45		0.35
301	13.66	34.39	25.80		0.58
351	11.01	34.17	26.15		0.97
402	09.69	34.12	26.34		1.21
502	07.29	34.08	26.67		1.76

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	25.18	35.27	23.51	0.000	1.365
10	25.17	35.28	23.52	0.044	1.321
20	25.12	35.30	23.55	0.088	1.277
30	25.10	35.33	23.58	0.131	1.234
50	25.09	35.33	23.58	0.218	1.147
75	23.31	35.34	24.12	0.320	1.045
100	22.60	35.39	24.36	0.413	0.952
150	20.55	35.26	24.83	0.583	0.782
200	19.23	35.11	25.07	0.736	0.629
250	16.65	34.77	25.44	0.876	0.489
300	13.73	34.39	25.79	0.999	0.366
400	09.78	34.13	26.33	1.203	0.162
500	07.32	34.08	26.67	1.365	0.000

STATION 9

M/V Hugh M. Smith: Cruise 21, 21°52'N, 155°23'W, August 7, 1953. Messenger time: 1437 GCT. Weather: 25, cloud coverage 3. Wind: 110°, 27 kt. Sea: 5-12 ft. Wire angle: 12°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.91	35.07	23.44		0.24
37	24.92	35.08	23.45		0.24
65	24.48	35.41	23.83		0.18
92	23.47	35.36	24.09		0.16
117	22.23	35.34	24.43		0.21
144	21.54	35.34	24.62		0.22
168	20.69	35.29	24.82		0.24
224	18.50	34.99	25.16		0.36
276	15.22	34.52	25.57		0.61
330	11.56	34.13	26.01		1.10
385	09.83	34.14	26.33		1.47
437	07.99	34.06	26.56		1.60
543	06.24	34.11	26.84		2.10

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.91	35.07	23.44	0.000	1.382
10	24.91	35.07	23.44	0.045	1.337
20	24.91	35.07	23.44	0.089	1.293
30	24.92	35.08	23.45	0.134	1.248
50	24.92	35.08	23.45	0.223	1.159
75	24.18	35.40	23.91	0.329	1.053
100	23.00	35.34	24.21	0.427	0.955
150	21.32	35.34	24.68	0.604	0.778
200	19.47	35.13	25.02	0.762	0.620
250	17.08	34.78	25.35	0.906	0.476
300	13.13	34.24	25.80	1.031	0.351
400	09.26	34.14	26.42	1.229	0.153
500	06.71	34.10	26.77	1.382	0.000

STATION 10

M/V Hugh M. Smith: Cruise 21, 21°25'N, 154°43'W, August 7, 1953. Messenger time: 2137 GCT. Weather: 02, cloud coverage 3. Wind: 090°, 18 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.89	35.26	23.59		0.23
21	24.80	35.26	23.62		0.19
44	24.53	35.36	23.77		0.17
60	23.42	35.37	24.11		0.13
81	22.38	35.71	24.67		0.11
100	21.62	35.37	24.62		0.17
150	20.24	35.29	24.94		0.15
200	18.68	35.06	25.16		0.26
251	15.02	34.51	25.61		0.58
300	12.39	34.27	25.97		0.80
352	09.92	34.14	26.31		1.19
404	08.66	34.10	26.49		1.51
509	06.77	34.12	26.78		2.05

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.89	35.26	23.59	0.000	1.293
10	24.87	35.26	23.60	0.043	1.250
20	24.81	35.26	23.62	0.086	1.207
30	24.69	35.35	23.72	0.129	1.164
50	24.46	35.36	23.80	0.212	1.081
75	22.55	35.37	24.36	0.309	0.984
100	21.62	35.37	24.62	0.396	0.897
150	20.24	35.29	24.94	0.557	0.736
200	18.68	35.06	25.17	0.705	0.588
250	15.08	34.51	25.60	0.839	0.454
300	12.39	34.27	25.97	0.954	0.339
400	08.78	34.10	26.47	1.142	0.151
500	06.85	34.12	26.77	1.293	0.000

STATION 11

M/V Hugh M. Smith: Cruise 21, 21°00'N, 154°18'W, August 8, 1953. Messenger time: 0326 GCT. Weather: 16, cloud coverage 9. Wind: 080°, 18 kt. Sea: 5-8 ft. Wire angle: 23°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.87	34.90	23.33		0.29
25	24.85	34.91	23.34		0.29
44	24.80	34.96	23.39		0.29
65	24.36	35.32	23.79		0.24
84	23.25	35.33	24.13		0.24
103	22.39	35.34	24.39		0.21
149	20.28	35.21	24.86		0.32
198	17.84	34.88	25.24		0.43
248	14.54	34.45	25.67		0.70
296	12.44	34.42	26.07		0.81
346	10.22	34.14	26.26		1.24
398	08.72	34.10	26.48		1.59
497	06.91	34.18	26.81		2.29

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.87	34.90	23.33	0.000	1.309
10	24.86	34.90	23.33	0.046	1.263
20	24.86	34.91	23.34	0.091	1.218
30	24.84	34.91	23.34	0.137	1.172
50	24.78	35.02	23.44	0.227	1.082
75	23.78	35.35	23.99	0.332	0.977
100	22.45	35.34	24.37	0.427	0.882
150	20.27	35.21	24.87	0.596	0.713
200	17.74	34.87	25.26	0.744	0.565
250	14.41	34.45	25.69	0.873	0.436
300	12.25	34.42	26.11	0.982	0.327
400	08.62	34.10	26.49	1.162	0.147
500	06.88	34.18	26.81	1.309	0.000

STATION 12

M/V Hugh M. Smith: Cruise 21, 20°34'N, 153°46'W, August 8, 1953. Messenger time: 0939 GCT. Weather: 02, cloud coverage 3. Wind: 090°, 21 kt. Sea: 5-8 ft. Wire angle: 18°. Depth of water: 2800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.79	34.85	23.31		0.25
35	24.80	34.86	23.32		0.22
65	24.41	34.85	23.43		0.21
79	23.32	35.00	23.86		0.28
99	21.72	34.90	24.24		0.30
119	19.66	34.86	24.76		0.46
163	18.08	34.82	25.13		0.54
218	15.32	34.51	25.54		0.66
271	11.91	34.19	26.00		1.39
322	09.95	34.12	26.29		1.21
377	08.26	34.08	26.53		1.72
431	07.18	34.06	26.68		2.06
538	06.04	34.22	26.95		2.37

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.79	34.85	23.31	0.000	1.284
10	24.80	34.85	23.31	0.046	1.238
20	24.80	34.86	23.32	0.092	1.192
30	24.80	34.86	23.32	0.137	1.147
50	24.71	34.86	23.34	0.229	1.055
75	23.38	35.00	23.84	0.337	0.947
100	21.58	34.89	24.27	0.435	0.849
150	18.63	34.85	25.02	0.602	0.682
200	16.76	34.68	25.34	0.745	0.539
250	12.99	34.26	25.84	0.868	0.416
300	10.85	34.14	26.15	0.972	0.312
400	07.71	34.07	26.61	1.144	0.140
500	06.29	34.11	26.83	1.284	0.000

STATION 13

M/V Hugh M. Smith: Cruise 21, 19°35'N, 154°11'W, August 8, 1953. Messenger time: 1831 GCT. Weather: 02, cloud coverage 8. Wind: 080°, 18 kt. Sea: 5-8 ft. Wire angle: > 05°. Depth of water: 3000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
04	24.64	34.80	23.32		0.34
36	24.62	34.79	23.32		0.30
58	24.42	34.88	23.44		0.32
79	23.50	34.97	23.79		0.26
102	22.70	35.15	24.15		0.21
122	21.86	35.15	24.39		0.24
166	19.93	35.07	24.85		0.39
218	18.15	34.87	25.15		0.50
273	13.84	34.33	25.72		1.04
327	10.86	34.11	26.13		1.12
382	09.26	34.14	26.42		1.67
436	07.98	34.14	26.62		2.11
542	06.51	34.21	26.88		2.35

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.64	34.80	23.32	0.000	1.368
10	24.63	34.80	23.32	0.046	1.322
20	24.63	34.80	23.32	0.091	1.277
30	24.62	34.79	23.32	0.137	1.231
50	24.60	34.84	23.36	0.228	1.140
75	23.80	34.95	23.68	0.338	1.030
100	22.82	35.14	24.11	0.440	0.928
150	20.60	35.11	24.71	0.619	0.749
200	18.82	34.95	25.05	0.776	0.592
250	15.70	34.55	25.49	0.915	0.453
300	12.06	34.17	25.95	1.033	0.335
400	08.80	34.14	26.50	1.220	0.148
500	06.94	34.18	26.80	1.368	0.000

STATION 14

M/V Hugh M. Smith: Cruise 21, 20°06'N, 154°39'W, August 9, 1953. Messenger time: 0102 GCT. Weather: 02, cloud coverage 8. Wind: 090°, 15 kt. Sea: 3-5 ft. Wire angle: 10°. Depth of water: 3000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.24	35.16	23.40		0.20
26	25.08	35.15	23.45		0.20
51	24.78	35.30	23.65		0.16
68	23.54	35.36	24.07		0.18
84	22.72	35.34	24.29		0.15
104	22.01	35.37	24.51		0.20
156	20.10	35.23	24.93		0.28
208	17.56	34.88	25.31		0.45
259	14.22	34.37	25.67		0.80
311	11.14	34.17	26.12		1.04
365	09.36	34.19	26.44		1.56
415	08.25	34.14	26.58		1.96
517	06.60	34.22	26.88		2.34

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.24	35.16	23.41	0.000	1.295
10	25.21	35.16	23.42	0.045	1.250
20	25.15	35.15	23.43	0.090	1.205
30	25.05	35.18	23.48	0.134	1.161
50	24.79	35.30	23.65	0.221	1.074
75	23.08	35.35	24.20	0.321	0.974
100	22.15	35.36	24.47	0.412	0.883
150	20.30	35.26	24.90	0.578	0.717
200	18.05	34.96	25.25	0.726	0.569
250	15.00	34.49	25.60	0.857	0.438
300	11.65	34.18	26.04	0.970	0.325
400	08.62	34.15	26.53	1.152	0.143
500	06.75	34.22	26.86	1.295	0.000

STATION 15

M/V Hugh M. Smith: Cruise 21, 20°29'N, 155°13'W, August 9, 1953. Messenger time: 0750 GCT. Weather: 02, cloud coverage 5. Wind: 110°, 22 kt. Sea: 5-8 ft. Wire angle: 12°. Depth of water: 1400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.94	35.26	23.57		0.19
25	24.94	35.25	23.57		0.17
56	24.78	35.35	23.69		0.11
81	24.50	35.42	23.83		0.15
102	22.60	35.35	24.33		0.12
122	21.45	35.41	24.70		0.13
162	20.00	35.24	24.96		0.26
217	17.36	34.82	25.31		0.43
273	13.86	34.38	25.75		0.67
324	11.41	34.21	26.10		0.98
379	09.32	34.12	26.40		1.42
431	08.07	34.14	26.61		1.93
540	06.26	34.18	26.89		2.48

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.94	35.26	23.58	0.000	1.322
10	24.94	35.26	23.58	0.043	1.279
20	24.94	35.25	23.57	0.087	1.235
30	24.94	35.25	23.57	0.130	1.192
50	24.93	35.28	23.59	0.217	1.105
75	24.57	35.42	23.81	0.322	1.000
100	22.70	35.35	24.31	0.420	0.902
150	20.53	35.33	24.89	0.590	0.732
200	17.90	34.90	25.24	0.738	0.584
250	15.22	34.54	25.59	0.870	0.452
300	12.61	34.28	25.93	0.896	0.336
400	08.78	34.12	26.48	1.175	0.147
500	06.79	34.17	26.82	1.322	0.000

STATION 16

M/V Hugh M. Smith: Cruise 21, 21°00'N, 155°55'W, August 9, 1953. Messenger time: 1457 GCT. Weather: 02, cloud coverage 9. Wind: 080°, 18 kt. Sea: 3-8 ft. Wire angle: 15°. Depth of water: 1800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.89	35.06	23.44		0.24
30	24.91	35.04	23.42		0.20
60	24.91	35.06	23.43		0.20
81	24.02	35.25	23.84		0.17
90	23.26	35.21	24.04		0.14
100	22.63	35.17	24.19		0.21
149	21.16	35.20	24.62		0.23
200	19.60	35.10	24.96		0.28
251	16.24	34.65	25.44		0.63
302	12.35	34.23	25.94		1.09
352	09.84	34.14	26.33		1.62
402	08.24	34.14	26.58		1.98
503	06.65	34.16	26.83		2.41

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.89	35.06	23.44	0.000	1.361
10	24.90	35.05	23.43	0.045	1.316
20	24.90	35.05	23.43	0.089	1.272
30	24.91	35.04	23.42	0.134	1.227
50	24.91	35.05	23.43	0.224	1.137
75	24.30	35.26	23.77	0.332	1.029
100	22.63	35.17	24.19	0.431	0.930
150	21.13	35.20	24.63	0.610	0.751
200	19.60	35.10	24.96	0.771	0.590
250	16.32	34.65	25.42	0.914	0.447
300	12.43	34.23	25.93	1.034	0.327
400	08.30	34.14	26.57	1.219	0.142
500	06.67	34.16	26.82	1.361	0.000

STATION 17

M/V Hugh M. Smith: Cruise 21, 21°20'N, 156°23'W, August 9, 1953. Messenger time: 2035 GCT. Weather: 02, cloud coverage 6. Wind: 070°, 22 kt. Sea: 5-8 ft. Wire angle: 25°. Depth of water: 300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.88	35.01	23.41		0.26
29	24.88	34.96	23.37		0.27
65	24.87	35.08	23.46		0.26
75	23.88	35.08	23.76		0.24
89	23.22	35.22	24.06		0.22
99	22.89	35.31	24.22		0.18
114	22.34	35.34	24.40		0.18
143	21.56	35.35	24.62		0.22
190	20.11	35.27	24.96		0.30
237	18.34	34.94	25.16		0.38
285	14.94	34.47	25.60		0.80
381	10.07	34.14	26.29		1.74
480	07.32	34.13	26.71		2.38

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.88	35.01	23.41	0.000	1.400
10	24.88	35.00	23.40	0.045	1.355
20	24.88	34.98	23.38	0.090	1.310
30	24.88	34.96	23.37	0.135	1.265
50	24.88	35.05	23.44	0.225	1.175
75	23.88	35.08	23.76	0.334	1.066
100	22.81	35.31	24.24	0.432	0.968
150	21.31	35.35	24.69	0.608	0.792
200	19.70	35.22	25.03	0.766	0.634
250	17.63	34.82	25.24	0.912	0.488
300	14.07	34.40	25.73	1.041	0.359
400	09.40	34.14	26.40	1.245	0.155
500	07.05	34.13	26.75	1.400	0.000

STATION 18

M/V Hugh M. Smith: Cruise 21, 21°48'N, 156°53'W, August 10, 1953. Messenger time: 0257 GCT. Weather: 02, cloud coverage 6. Wind: 080°, 25 kt. Sea: 5-8 ft. Wire angle: 18°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.00	35.01	23.37		0.27
28	25.01	35.04	23.39		0.27
63	25.00	35.01	23.37		0.23
81	24.25	35.18	23.72		0.21
97	23.70	35.19	23.89		0.19
112	22.80	35.20	24.16		0.23
126	22.31	35.22	24.32		0.22
156	21.64	35.34	24.59		0.22
207	20.26	35.30	24.94		0.23
259	17.64	34.87	25.28		0.40
309	14.46	34.43	25.67		0.73
414	09.48	34.09	26.35		1.65
517	07.22	34.14	26.73		2.30

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.00	35.01	23.37	0.000	1.457
10	25.00	35.02	23.38	0.045	1.412
20	25.01	35.03	23.38	0.090	1.367
30	25.01	35.04	23.39	0.136	1.321
50	25.00	35.03	23.38	0.226	1.231
75	24.80	35.12	23.51	0.338	1.119
100	23.56	35.18	23.93	0.443	1.014
150	21.76	35.33	24.56	0.630	0.827
200	20.55	35.33	24.89	0.795	0.662
250	18.12	34.95	25.22	0.944	0.513
300	15.01	34.51	25.61	1.077	0.380
400	10.08	34.10	26.26	1.294	0.163
500	07.37	34.15	26.72	1.457	0.000

STATION 19

M/V Hugh M. Smith: Cruise 21, 22°17'N, 157°26'W, August 10, 1953. Messenger time: 0917 GCT. Weather: 02, cloud coverage 2. Wind: 070°, 20 kt. Sea: 5-8 ft. Wire angle: 12°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.94	35.01	23.39		0.34
32	24.96	35.03	23.40		0.33
66	24.96	35.07	23.43		0.28
88	24.19	35.23	23.78		0.24
109	22.68	35.24	24.23		0.27
131	22.08	35.33	24.46		0.26
163	21.52	35.42	24.69		0.27
217	20.77	35.36	24.85		0.29
270	18.60	35.05	25.18		0.39
324	14.52	34.44	25.66		0.72
381	11.18	34.26	26.19		1.25
434	09.13	34.30	26.57		1.76
541	06.84	34.32	26.93		2.56

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.94	35.01	23.39	0.000	1.453
10	24.94	35.02	23.40	0.045	1.408
20	24.95	35.02	23.39	0.090	1.363
30	24.96	35.03	23.40	0.135	1.318
50	24.96	35.05	23.41	0.225	1.228
75	24.52	35.21	23.67	0.335	1.118
100	22.95	35.23	24.14	0.436	1.017
150	21.78	35.40	24.60	0.616	0.837
200	20.97	35.39	24.82	0.782	0.671
250	19.54	35.19	25.05	0.937	0.516
300	16.41	34.72	25.46	1.078	0.375
400	10.36	34.26	26.33	1.299	0.154
500	07.40	34.32	26.85	1.453	0.000

STATION 20

M/V Hugh M. Smith: Cruise 21, 22°40'N, 157°56'W, August 10, 1953. Messenger time: 1545 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 19 kt. Sea: 5-8 ft. Wire angle: 12°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.02	35.00	23.35		0.28
26	25.03	34.99	23.34		0.25
53	25.02	34.97	23.33		0.25
73	24.86	34.99	23.40		0.29
90	24.64	35.09	23.54		0.26
107	23.69	35.08	23.81		0.29
159	21.70	35.34	24.58		0.29
212	20.16	35.25	24.93		0.37
266	17.90	34.88	25.22		0.49
319	14.28	34.34	25.64		0.94
373	11.04	34.21	26.17		1.31
428	09.72	34.12	26.33		1.78
533	07.65	34.09	26.63		2.28

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.02	35.00	23.36	0.000	1.495
10	25.02	35.00	23.36	0.045	1.450
20	25.03	34.99	23.35	0.091	1.404
30	25.03	34.98	23.34	0.136	1.359
50	25.02	34.97	23.33	0.228	1.267
75	24.85	35.02	23.42	0.341	1.154
100	24.00	35.08	23.72	0.450	1.045
150	22.01	35.31	24.47	0.644	0.851
200	20.53	35.31	24.88	0.811	0.684
250	18.59	35.00	25.14	0.963	0.532
300	15.61	34.50	25.47	1.101	0.394
400	10.37	34.17	26.26	1.324	0.171
500	08.06	34.09	26.57	1.495	0.000

STATION 21

M/V Hugh M. Smith: Cruise 21, 23°08'N, 158°27'W, August 10, 1953. Messenger time: 2202 GCT. Weather: 01, cloud coverage 2. Wind: 080°, 21 kt. Sea: 5-8 ft. Wire angle: 15°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.40	35.07	23.29		0.30
25	25.38	35.07	23.30		0.29
45	25.45	35.17	23.35		0.24
64	25.49	35.30	23.44		0.20
79	25.34	35.28	23.47		0.18
98	23.96	35.37	23.95		0.15
153	21.18	35.29	24.68		0.17
203	18.94	35.04	25.09		0.26
259	16.10	34.58	25.42		0.73
313	13.31	34.27	25.78		0.85
367	10.76	34.12	26.15		1.29
423	09.21	34.04	26.35		1.57
528	07.06	34.01	26.65		2.14

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.40	35.07	23.29	0.000	1.436
10	25.39	35.07	23.30	0.046	1.390
20	25.37	35.07	23.30	0.092	1.344
30	25.36	35.08	23.31	0.138	1.298
50	25.48	35.24	23.40	0.229	1.207
75	25.44	35.30	23.45	0.341	1.095
100	23.87	35.37	23.98	0.447	0.989
150	21.24	35.30	24.68	0.629	0.807
200	19.10	35.06	25.06	0.787	0.649
250	16.48	34.64	25.38	0.929	0.507
300	14.09	34.34	25.68	1.056	0.380
400	09.81	34.07	26.28	1.268	0.168
500	07.44	34.01	26.60	1.436	0.000

STATION 22

M/V Hugh M. Smith: Cruise 21, 23°35'N, 159°05'W, August 11, 1953. Messenger time: 0445 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 18 kt. Sea: 5-8 ft. Wire angle: 12°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	25.47	35.22	23.38		0.21
28	25.43	35.22	23.40		0.19
51	25.41	35.20	23.39		0.20
72	23.68	35.18	23.89		0.23
82	23.33	35.21	24.02		0.21
103	22.56	35.27	24.28		0.24
124	21.78	35.30	24.53		0.28
154	20.90	35.26	24.73		0.25
206	19.36	35.12	25.04		0.27
257	16.31	34.68	25.45		0.55
309	13.50	34.36	25.81		0.81
411	10.38	34.15	26.24		1.26
513	08.04	34.05	26.54		1.91

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.47	35.22	23.38	0.000	1.418
10	25.46	35.22	23.39	0.045	1.373
20	25.45	35.22	23.39	0.090	1.328
30	25.43	35.22	23.40	0.135	1.283
50	25.41	35.20	23.39	0.226	1.192
75	23.58	35.18	23.92	0.332	1.086
100	22.68	35.25	24.24	0.429	0.989
150	21.01	35.27	24.72	0.605	0.813
200	19.59	35.15	25.00	0.763	0.655
250	16.75	34.74	25.39	0.906	0.512
300	13.88	34.40	25.77	1.030	0.388
400	10.69	34.17	26.20	1.242	0.176
500	08.22	34.06	26.52	1.418	0.000

STATION 24 [1/]

M/V Hugh M. Smith: Cruise 21, 22°40'N, 159°42'W, August 11, 1953. Messenger time: 1506 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 20 kt. Sea: 5-8 ft. Wire angle: 25°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.09	34.97	23.31		0.32
29	25.11	34.94	23.28		0.30
52	25.12	34.96	23.30		0.29
72	24.86	34.92	23.34		0.32
91	24.11	35.08	23.69		0.25
114	22.92	35.20	24.13		0.25
143	21.96	35.25	24.45		0.26
189	20.83	35.28	24.77		0.28
236	19.52	35.13	25.00		0.34
286	17.06	34.70	25.29		0.58
335	13.14	34.21	25.77		1.30
382	10.96	34.13	26.13		1.58
479	08.12	34.10	26.57		1.98

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.09	34.97	23.31	0.000	1.499
10	25.10	34.96	23.30	0.046	1.453
20	25.10	34.95	23.29	0.092	1.407
30	25.11	34.94	23.28	0.138	1.361
50	25.12	34.96	23.30	0.230	1.269
75	24.80	34.93	23.37	0.345	1.154
100	23.80	35.12	23.81	0.453	1.046
150	21.75	35.26	24.50	0.644	0.855
200	20.56	35.27	24.84	0.811	0.688
250	19.05	35.05	25.07	0.966	0.533
300	15.65	34.49	25.45	1.106	0.393
400	10.20	34.12	26.25	1.330	0.169
500	07.75	34.10	26.63	1.499	0.000

1/ Station 23 was a trawl station.

STATION 25

M/V Hugh M. Smith: Cruise 21, 22°22'N, 159°13'W, August 11, 1953. Messenger time: first cast 2123 GCT, second cast 2141 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 21 kt. Sea: 5-8 ft. Wire angle: first cast 18°, second cast 18°. Depth of water: 1600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.08	34.99	23.33		0.27
32	25.02	34.98	23.34		0.26
64	25.04	34.98	23.33		0.25
88	24.44	35.06	23.58		0.21
102	23.56	35.14	23.90		0.17
131	22.72	35.16	24.16		0.25
160	21.72	35.35	24.58		0.21
199	20.21	35.17	24.85		0.29
249	18.68	34.98	25.11		0.36
305	14.81	34.43	25.59		0.67
357	11.16	34.19	26.14		1.45
357	11.47	34.19	26.08		-
407	09.92	34.10	26.28		1.68
512	07.18	34.09	26.70		2.24

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	25.08	34.99	23.33	0.000	1.484
10	25.07	34.99	23.33	0.046	1.438
20	25.05	34.98	23.33	0.091	1.393
30	25.02	34.98	23.34	0.137	1.347
50	25.03	34.98	23.34	0.228	1.256
75	25.02	34.98	23.34	0.343	1.141
100	23.61	35.14	23.88	0.451	1.033
150	22.15	35.23	24.37	0.643	0.841
200	20.20	35.17	24.86	0.813	0.671
250	18.64	34.98	25.12	0.966	0.518
300	15.21	34.48	25.54	1.103	0.381
400	10.13	34.15	26.29	1.321	0.163
500	07.32	34.10	26.69	1.484	0.000

STATION 26

M/V Hugh M. Smith: Cruise 21, 21°58'N, 158°39'W, August 12, 1953. Messenger time: 0406 GCT. Weather: 02, cloud coverage 4. Wind: 060°, 19 kt. Sea: 3-8 ft. Wire angle: 15°. Depth of water: 900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.00	34.55	23.02		0.35
15	25.02	34.59	23.05		0.33
36	25.00	34.61	23.07		0.34
52	24.91	34.70	23.16		0.33
67	24.10	34.86	23.53		0.28
84	23.28	34.98	23.86		0.28
105	22.54	35.06	24.13		0.28
157	21.22	35.14	24.56		0.33
209	19.22	34.97	24.96		0.47
262	15.27	34.45	25.51		0.76
315	12.92	34.26	25.86		1.19
419	08.22	34.18	26.62		2.11
525	06.32	34.14	26.86		2.77

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.00	34.55	23.02	0.000	1.415
10	25.01	34.57	23.03	0.048	1.367
20	25.02	34.58	23.04	0.097	1.318
30	25.01	34.60	23.06	0.145	1.270
50	24.92	34.69	23.15	0.241	1.174
75	23.68	34.94	23.71	0.353	1.062
100	22.70	35.05	24.08	0.455	0.960
150	21.41	35.15	24.52	0.639	0.776
200	19.59	35.03	24.91	0.804	0.611
250	15.99	34.55	25.42	0.948	0.467
300	13.61	34.30	25.75	1.072	0.343
400	09.00	34.19	26.50	1.270	0.145
500	06.54	34.16	26.84	1.415	0.000

STATION 27

M/V Hugh M. Smith: Cruise 21, 21°17'N, 158°18'W, August 12, 1953. Messenger time: 1051 GCT. Weather: 02, cloud coverage 2. Wind: 090°, 13 kt. Sea: < 1 ft. Wire angle: 06°. Depth of water: 1000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.84	34.94	23.06		0.29
20	25.86	34.91	23.03		0.27
40	25.86	34.87	23.00		0.26
61	25.23	34.83	23.16		0.31
76	25.04	35.00	23.35		0.26
91	24.38	34.88	23.46		0.30
122	21.82	35.13	24.39		0.32
152	20.12	35.07	24.80		0.43
203	18.04	34.87	25.18		0.51
253	15.69	34.59	25.52		0.65
304	11.90	34.23	26.03		1.22
406	08.34	34.11	26.54		1.96
506	06.74	34.20	26.85		2.39

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	25.84	34.94	23.06	0.000	1.398
10	25.85	34.93	23.05	0.048	1.350
20	25.86	34.91	23.03	0.097	1.301
30	25.87	34.89	23.01	0.145	1.253
50	25.80	34.86	23.01	0.243	1.155
75	25.08	34.99	23.33	0.361	1.037
100	24.21	34.91	23.53	0.474	0.924
150	20.17	35.09	24.80	0.664	0.734
200	18.21	34.89	25.15	0.816	0.582
250	15.92	34.62	25.49	0.953	0.445
300	12.18	34.25	25.99	1.069	0.329
400	08.48	34.11	26.52	1.254	0.144
500	06.74	34.20	26.85	1.398	0.000

STATION 28

M/V Hugh M. Smith: Cruise 21, 21°51'N, 157°37'W, August 14, 1953. Messenger time: 0406 GCT. Weather: 02, cloud coverage 4. Wind: 090°, 16 kt. Sea: 1-3 ft. Wire angle: 15°. Depth of water: 1200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.13	35.09	23.39		0.22
10	25.12	35.04	23.36		0.25
25	24.96	34.96	23.34		0.23
49	24.94	34.95	23.34		0.27
69	23.82	35.06	23.76		0.20
88	22.95	35.09	24.04		0.19
116	22.34	35.15	24.26		0.26
146	21.82	35.31	24.52		0.25
195	21.08	35.32	24.73		0.23
244	19.83	35.24	25.01		0.29
293	17.26	34.73	25.26		0.48
391	10.01	34.07	26.24		1.65
490	08.02	34.12	26.60		2.08

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.13	35.09	23.39	0.000	1.481
10	25.12	35.04	23.36	0.045	1.436
20	24.99	34.98	23.35	0.091	1.390
30	24.96	34.96	23.34	0.136	1.345
50	24.94	34.95	23.34	0.227	1.254
75	23.41	35.08	23.90	0.335	1.146
100	22.61	35.10	24.14	0.433	1.048
150	21.80	35.30	24.52	0.616	0.865
200	20.94	35.32	24.77	0.784	0.697
250	19.66	35.20	25.02	0.942	0.539
300	16.80	34.67	25.33	1.086	0.395
400	09.73	34.08	26.30	1.314	0.167
500	07.95	34.12	26.61	1.481	0.000

STATION 29

M/V Hugh M. Smith: Cruise 21, 21°24'N, 157°34'W, August 14, 1953. Messenger time: 0924 GCT. Weather: 01, cloud coverage 3. Wind: 070°, 20 kt. Sea: 3-5 ft. Wire angle: 12°. Depth of water: 400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.18	35.06	23.35		0.36
25	24.84	35.08	23.47		0.27
44	24.82	34.96	23.39		0.28
70	24.18	35.09	23.67		0.24
104	22.68	35.16	24.17		0.21
126	21.97	35.25	24.43		0.28
146	21.61	35.25	24.54		0.26
179	21.11	35.19	24.63		0.24
213	19.81	35.07	24.88		0.34
262	16.80	34.71	25.36		0.55
311	13.34	34.24	25.75		0.89
413	09.32	34.05	26.34		1.91
515	06.72	34.05	26.73		-

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	25.18	35.06	23.35	0.000	1.443
10	25.18	35.06	23.35	0.045	1.398
20	24.85	35.08	23.47	0.090	1.353
30	24.84	35.06	23.46	0.135	1.308
50	24.82	34.95	23.38	0.225	1.218
75	23.80	35.10	23.80	0.333	1.110
100	22.80	35.14	24.12	0.433	1.010
150	21.56	35.24	24.54	0.615	0.828
200	20.39	35.12	24.77	0.783	0.660
250	17.99	34.84	25.17	0.937	0.506
300	14.01	34.33	25.69	1.069	0.374
400	09.80	34.06	26.27	1.281	0.162
500	06.86	34.06	26.72	1.443	0.000

STATION 30

M/V Hugh M. Smith: Cruise 21, 21°02'N, 157°31'W, August 14, 1953. Messenger time: 1347 GCT. Weather: 02, cloud coverage 3. Wind: 030°, 12 kt. Sea: 1-3 ft. Wire angle: 00°. Depth of water: 30 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.14	35.16	23.13		0.32
10	26.15	35.01	23.01		0.33
20	26.13	34.97	22.99		0.31
30	25.10	35.06	23.38		0.32
46	24.48	35.03	23.54		0.29

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)

STATION 31

M/V Hugh M. Smith: Cruise 21, 20°33'N, 157°30'W, August 14, 1953. Messenger time: 1910 GCT. Weather: 02, cloud coverage 9. Wind: 030°, 13 kt. Sea: 1-3 ft. Wire angle: 00°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.06	34.90	22.96		0.31
09	26.03	34.93	22.99		0.25
25	25.88	34.90	23.02		0.27
51	25.70	34.88	23.06		0.27
71	25.33	34.84	23.14		0.25
91	24.97	34.82	23.24		0.29
123	23.74	34.95	23.70		0.21
154	22.19	35.18	24.32		0.25
204	19.68	35.02	24.88		0.39
256	16.32	34.56	25.35		0.71
307	12.72	34.18	25.83		1.04
408	08.74	34.02	26.41		2.02
509	06.90	34.07	26.72		2.60

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.06	34.90	22.96	0.000	1.496
10	26.03	34.93	22.99	0.049	1.447
20	25.95	34.91	23.00	0.098	1.398
30	25.87	34.90	23.02	0.147	1.349
50	25.70	34.88	23.06	0.244	1.252
75	25.24	34.83	23.16	0.363	1.133
100	24.74	34.83	23.31	0.481	1.015
150	22.49	35.16	24.22	0.690	0.806
200	19.92	35.06	24.85	0.864	0.632
250	16.70	34.62	25.31	1.012	0.484
300	13.10	34.22	25.79	1.138	0.358
400	08.98	34.03	26.38	1.339	0.157
500	06.97	34.08	26.72	1.496	0.000

STATION 32

M/V Hugh M. Smith: Cruise 21, 20°38'N, 157°01'W, August 14, 1953. Messenger time: 2340 GCT. Weather: 02, cloud coverage 9. Wind: Calm. Sea: < 1 ft. Wire angle: 02°. Depth of water: 300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.86	34.96	23.07		0.32
15	25.18	34.97	23.29		0.35
30	25.04	34.96	23.32		0.32
49	24.86	34.97	23.38		0.31
71	23.89	35.03	23.72		0.30
85	22.82	35.15	24.12		0.38
102	22.52	35.17	24.22		0.32
156	20.57	35.12	24.72		0.47
207	18.50	34.87	25.07		0.61
265	14.67	34.41	25.61		0.96
313	11.39	34.15	26.06		1.48
413	08.90	34.12	26.46		2.12
514	06.80	-	-		2.85

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.86	34.96	23.07	0.000	1.377
10	25.32	34.97	23.24	0.047	1.330
20	25.11	34.97	23.31	0.093	1.284
30	25.04	34.96	23.32	0.139	1.238
50	24.85	34.97	23.39	0.230	1.147
75	23.78	35.04	23.76	0.339	1.038
100	22.55	35.17	24.21	0.438	0.939
150	20.80	35.13	24.67	0.616	0.761
200	18.83	34.92	25.02	0.775	0.602
250	15.68	34.52	25.47	0.915	0.462
300	11.99	34.18	25.97	1.032	0.345
400	09.27	34.12	26.41	1.223	0.154
500	06.95	34.12	26.75	1.377	0.000

STATION 34 [1/]

M/V Hugh M. Smith: Cruise 21, 20°12'N, 156°40'W, August 15, 1953. Messenger time: 0829 GCT. Weather: 02, cloud coverage 3. Wind: 060°, 19 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 1600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
01	26.00	34.96	23.02		0.31
15	26.00	34.95	23.01		0.31
31	25.98	34.94	23.01		0.31
45	25.27	34.98	23.27		0.31
71	24.52	35.07	23.56		0.30
100	23.20	35.15	24.01		0.33
148	20.98	35.17	24.64		0.38
199	19.06	35.07	25.08		0.51
249	16.11	34.60	25.44		0.80
298	12.54	34.23	25.91		1.25
348	10.39	34.08	26.19		1.48
397	08.94	34.11	26.45		1.81
496	06.98	34.11	26.74		2.62

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.00	34.96	23.02	0.000	1.391
10	26.00	34.95	23.02	0.049	1.342
20	26.00	34.95	23.02	0.097	1.294
30	25.99	34.94	23.01	0.146	1.245
50	25.13	35.00	23.32	0.240	1.151
75	24.49	35.07	23.57	0.352	1.039
100	23.20	35.15	24.01	0.456	0.935
150	20.60	35.16	24.74	0.637	0.754
200	19.00	35.06	25.09	0.792	0.599
250	15.94	34.59	25.46	0.931	0.460
300	12.44	34.23	25.93	1.050	0.341
400	08.84	34.11	26.47	1.240	0.151
500	06.91	34.11	26.75	1.391	0.000

1/ Station 33 was a "Q-cast".

STATION 35

M/V Hugh M. Smith: Cruise 21, 19°43'N, 156°11'W, August 15, 1953. Messenger time: 1500 GCT. Weather: 02, cloud coverage 7. Wind: Calm. Sea: < 1 ft. Wire angle: 05°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.24	34.92	22.92		0.34
15	25.92	34.92	23.02		0.33
31	25.82	34.90	23.04		0.35
63	25.43	34.87	23.13		0.35
79	25.32	34.91	23.20		0.34
95	25.10	35.05	23.37		0.30
124	23.10	35.12	24.02		0.32
157	21.14	35.21	24.63		0.34
209	17.98	34.90	25.22		0.60
262	15.18	34.51	25.57		0.87
312	12.04	34.22	26.00		1.35
416	08.65	34.13	26.51		2.20
518	07.07	34.24	26.83		2.85

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.24	34.92	22.92	0.000	1.444
10	25.97	34.92	23.00	0.049	1.395
20	25.88	34.91	23.02	0.098	1.346
30	25.86	34.90	23.02	0.146	1.298
50	25.68	34.89	23.07	0.243	1.201
75	25.35	34.89	23.17	0.363	1.081
100	25.20	35.00	23.30	0.480	0.964
150	21.95	35.17	24.38	0.686	0.758
200	18.10	34.91	25.20	0.847	0.597
250	15.53	34.55	25.53	0.982	0.462
300	12.70	34.27	25.91	1.100	0.344
400	09.12	34.12	26.43	1.293	0.151
500	07.22	34.23	26.80	1.444	0.000

STATION 36

M/V Hugh M. Smith: Cruise 21, 18°50'N, 155°59'W, August 16, 1953. Messenger time: 0010 GCT. Weather: 01, cloud coverage 5. Wind: 090°, 21 kt. Sea: 3-5 ft. Wire angle: 18°. Depth of water: 1400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.90	34.85	22.97		0.39
23	25.82	34.88	23.02		0.38
46	25.78	34.89	23.04		0.38
74	25.58	34.85	23.07		0.39
102	25.40	34.85	23.13		0.42
125	25.12	34.95	23.29		0.37
151	22.30	35.09	24.22		0.32
189	19.98	34.99	24.78		0.52
224	18.56	34.83	25.02		0.59
270	15.32	34.42	25.47		1.01
320	11.27	34.08	26.03		1.61
425	08.28	34.17	26.60		2.58
531	06.83	34.14	26.79		2.98

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.90	34.85	22.97	0.000	1.492
10	25.87	34.86	22.99	0.049	1.443
20	25.84	34.87	23.01	0.098	1.394
30	25.80	34.89	23.03	0.146	1.346
50	25.74	34.87	23.04	0.244	1.248
75	25.54	34.85	23.08	0.365	1.127
100	25.41	34.85	23.12	0.485	1.007
150	22.37	35.09	24.20	0.699	0.793
200	19.62	34.95	24.84	0.873	0.619
250	16.74	34.60	25.29	1.022	0.470
300	12.70	34.15	25.81	1.148	0.344
400	08.85	34.16	26.51	1.342	0.150
500	07.22	34.15	26.74	1.492	0.000

STATION 37

M/V Hugh M. Smith: Cruise 21, 19°20'N, 156°32'W, August 16, 1953. Messenger time: 0745 GCT. Weather: 02, cloud coverage 3. Wind: 220°, 14 kt. Sea: < 1 ft. Wire angle: 23°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	26.34	34.98	22.93		0.31
10	25.60	34.96	23.15		0.31
23	25.51	35.01	23.21		0.27
36	25.16	34.99	23.31		0.30
59	23.90	35.14	23.80		0.29
69	23.14	35.17	24.04		0.33
91	22.30	35.16	24.27		0.29
136	20.80	35.17	24.69		0.40
182	18.16	34.88	25.16		0.62
229	15.08	34.49	25.58		0.93
275	12.79	34.22	25.85		1.31
365	09.24	34.22	26.49		2.10
456	07.60	34.16	26.69		2.62

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD1000 - ΔD (dyn. m)
00	26.34	34.98	22.93	0.000	1.302
10	25.60	34.96	23.15	0.048	1.254
20	25.53	35.00	23.20	0.096	1.206
30	25.25	35.00	23.29	0.142	1.160
50	24.68	35.02	23.47	0.233	1.069
75	22.80	35.17	24.14	0.336	0.966
100	22.02	35.16	24.35	0.429	0.873
150	19.89	35.10	24.89	0.597	0.705
200	16.92	34.72	25.34	0.743	0.559
250	13.90	34.34	25.72	0.870	0.432
300	11.72	34.20	26.04	0.980	0.322
400	08.54	34.22	26.60	1.158	0.144
500	07.00	34.16	26.78	1.302	0.000

STATION 38

M/V Hugh M. Smith: Cruise 21, 19°38'N, 157°09'W, August 16, 1953. Messenger time: 1345 GCT. Weather: 62, cloud coverage not recorded. Wind: 170°, 19 kt. Sea: 3-5 ft. Wire angle: 24°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
02	25.81	34.89	23.03		0.33
13	25.82	34.90	23.04		0.34
13	25.82	34.72	22.90		-
28	25.80	34.89	23.03		0.37
48	25.12	34.94	23.28		0.30
75	24.37	35.02	23.57		0.28
104	22.45	35.13	24.21		0.35
157	20.56	35.17	24.76		0.32
207	18.03	34.88	25.19		0.54
259	15.44	34.54	25.54		0.68
311	11.72	34.14	25.99		1.31
365	10.16	34.14	26.27		1.65
417	08.88	34.12	26.47		1.94
522	06.60	34.16	26.83		2.65

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.81	34.89	23.03	0.000	1.392
10	25.82	34.90	23.04	0.048	1.344
20	25.81	34.89	23.03	0.097	1.295
30	25.78	34.89	23.04	0.145	1.247
50	25.03	34.95	23.32	0.240	1.152
75	24.37	35.02	23.57	0.352	1.040
100	22.80	35.12	24.10	0.455	0.937
150	20.79	35.17	24.70	0.634	0.758
200	18.08	34.89	25.19	0.788	0.604
250	16.20	34.63	25.44	0.925	0.467
300	12.22	34.16	25.91	1.045	0.347
400	09.28	34.13	26.41	1.238	0.154
500	07.07	34.15	26.76	1.392	0.000

STATION 39

M/V Hugh M. Smith: Cruise 21, 20°07'N, 157°37'W, August 16, 1953. Messenger time: 2051 GCT. Weather: 02, cloud coverage 9. Wind: 090°, 18 kt. Sea: 3-5 ft. Wire angle: 12°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.88	34.90	23.01		0.41
20	25.78	34.92	23.06		0.39
45	25.58	34.93	23.13		0.29
65	25.46	34.94	23.18		0.33
98	25.07	34.92	23.28		0.20
129	24.15	35.23	23.79		0.27
163	21.38	35.18	24.55		0.12
204	19.98	35.13	24.88		0.50
259	16.69	34.72	25.39		0.93
314	13.24	34.34	25.85		1.04
369	10.34	34.34	26.40		1.48
423	08.97	34.20	26.52		2.14
529	06.72	34.17	26.83		2.66

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.88	34.90	23.02	0.000	1.484
10	25.84	34.91	23.04	0.049	1.435
20	25.78	34.92	23.06	0.097	1.387
30	25.63	34.93	23.12	0.145	1.339
50	25.54	34.94	23.15	0.240	1.244
75	25.30	34.93	23.22	0.358	1.126
100	25.06	34.92	23.28	0.475	1.009
150	22.31	35.20	24.30	0.683	0.801
200	20.12	35.14	24.86	0.855	0.629
250	17.38	34.82	25.30	1.003	0.481
300	14.20	34.40	25.70	1.131	0.353
400	09.50	34.26	26.48	1.333	0.151
500	07.32	34.17	26.74	1.484	0.000

STATION 40

M/V Hugh M. Smith: Cruise 21, 20°35'N, 158°07'W,
August 17, 1953. Messenger time: 0545 GCT.
Weather: 02, cloud coverage 9. Wind: 020°, 13 kt.
Sea: 1-3 ft. Wire angle: 08°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.36	34.97	22.92		0.36
10	26.30	34.97	22.94		0.34
21	26.03	34.95	23.00		0.40
41	26.02	34.96	23.01		0.36
62	25.74	34.97	23.11		0.34
103	24.93	-	-		-
154	22.16	35.21	24.35		0.30
206	20.03	34.99	24.76		0.38
258	16.48	34.63	25.37		0.82
310	12.44	34.27	25.96		1.13
362	10.38	34.17	26.26		1.54
412	09.14	34.14	26.44		1.87
514	07.03	34.15	26.76		2.52

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.36	34.97	22.92	0.000	1.490
10	26.30	34.97	22.94	0.049	1.441
20	26.03	34.95	23.01	0.099	1.391
30	26.03	34.95	23.01	0.147	1.343
50	25.90	34.96	23.06	0.244	1.246
75	25.54	34.98	23.18	0.364	1.126
100	25.09	35.01	23.34	0.481	1.009
150	22.41	35.21	24.28	0.688	0.802
200	20.27	35.02	24.72	0.863	0.627
250	16.90	34.67	25.30	1.014	0.476
300	13.01	34.32	25.88	1.138	0.352
400	09.41	34.15	26.41	1.334	0.156
500	07.30	34.15	26.73	1.490	0.000

STATION 41

M/V Hugh M. Smith: Cruise 21, 21°03'N, 158°42'W, August 17, 1953. Messenger time: 1230 GCT. Weather: 02, cloud coverage not recorded. Wind: 090°, 19 kt. Sea: 3-5 ft. Wire angle: 30°. Depth of water: 2000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.42	35.05	22.96		0.34
08	26.42	35.06	22.97		0.30
17	26.32	35.04	22.99		0.27
39	25.88	35.07	23.15		0.29
53	25.36	35.04	23.28		0.26
79	23.52	35.16	23.92		0.27
106	22.12	35.19	24.35		0.25
133	21.21	35.16	24.57		0.36
176	18.76	35.15	25.21		0.56
221	16.26	34.80	25.55		0.73
266	13.38	34.31	25.80		1.19
353	10.01	34.11	26.27		1.70
442	07.84	34.10	26.61		2.20

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.42	35.05	22.96	0.000	1.339
10	26.41	35.06	22.97	0.049	1.290
20	26.05	35.07	23.09	0.098	1.241
30	25.94	35.07	23.13	0.145	1.194
50	25.52	35.04	23.23	0.240	1.099
75	23.78	35.15	23.84	0.349	0.990
100	22.40	35.19	24.27	0.447	0.892
150	20.40	35.15	24.79	0.620	0.719
200	17.40	35.00	25.44	0.766	0.573
250	14.25	34.44	25.72	0.890	0.449
300	11.90	34.18	25.99	1.001	0.338
400	08.80	34.10	26.47	1.188	0.151
500	06.85	34.12	26.77	1.339	0.000

STATION 42

M/V Hugh M. Smith: Cruise 21, 21°29'N, 159°14'W, August 17, 1953. Messenger time: 1847 GCT. Weather: 15, cloud coverage 7. Wind: 090°, 15 kt. Sea: 1-3 ft. Wire angle: 20°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.26	34.98	22.96		0.34
17	26.24	34.98	22.96		0.35
32	25.98	34.96	23.03		0.30
49	25.78	34.99	23.11		0.31
66	25.22	35.00	23.29		0.30
98	23.36	35.10	23.93		0.26
126	22.13	35.23	24.37		0.28
159	21.22	35.19	24.59		0.30
205	19.28	35.03	24.99		0.44
247	16.50	34.63	25.37		0.69
294	13.69	34.33	25.75		1.02
390	08.97	34.06	26.41		1.90
487	07.16	34.10	26.71		2.55

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.26	34.98	22.96	0.000	1.432
10	26.24	34.98	22.96	0.049	1.383
20	26.22	34.98	22.97	0.098	1.334
30	26.12	34.97	22.99	0.147	1.285
50	25.75	34.99	23.12	0.244	1.188
75	24.63	35.02	23.49	0.359	1.073
100	23.20	35.12	23.99	0.464	0.968
150	21.51	35.21	24.53	0.650	0.782
200	19.60	35.06	24.93	0.814	0.618
250	16.27	34.61	25.40	0.958	0.474
300	13.35	34.30	25.80	1.082	0.350
400	08.73	34.06	26.45	1.279	0.153
500	06.95	34.11	26.75	1.432	0.000

STATION 43

M/V Hugh M. Smith: Cruise 21, 22°19'N, 160°20'W, August 18, 1953. Messenger time: 0514 GCT. Weather: 02, cloud coverage 9. Wind: 080°, 12 kt. Sea: 1-3 ft. Wire angle: 10°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.63	34.97	23.14		0.31
16	25.44	34.97	23.20		0.25
35	25.20	34.94	23.26		0.34
61	25.15	34.93	23.26		0.39
80	24.78	34.97	23.40		0.31
101	23.36	35.09	23.92		0.22
120	22.60	35.14	24.18		0.33
151	21.80	35.26	24.49		0.29
201	20.40	35.24	24.86		0.37
251	19.24	35.10	25.05		0.35
302	16.14	34.62	25.44		0.70
403	09.78	34.10	26.31		1.70
503	07.16	34.06	26.68		2.61

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.63	34.97	23.15	0.000	1.498
10	25.51	34.97	23.18	0.047	1.451
20	25.39	34.96	23.21	0.094	1.404
30	25.26	34.95	23.25	0.141	1.357
50	25.16	34.93	23.26	0.234	1.264
75	25.08	34.93	23.29	0.350	1.148
100	23.40	35.08	23.90	0.458	1.040
150	21.81	35.26	24.49	0.647	0.851
200	20.41	35.24	24.85	0.814	0.684
250	19.30	35.11	25.05	0.969	0.529
300	16.22	34.64	25.44	1.110	0.388
400	09.95	34.10	26.28	1.334	0.164
500	07.21	34.06	26.67	1.498	0.000

STATION 44

M/V Hugh M. Smith: Cruise 21, 22°06'N, 160°58'W, August 18, 1953. Messenger time: 1128 GCT. Weather: 02, cloud coverage not recorded. Wind: 070°, 12 kt. Sea: 1-3 ft. Wire angle: 08°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.19	35.00	22.99		0.34
15	25.90	35.01	23.09		0.33
31	25.52	34.96	23.17		0.32
62	24.88	34.97	23.37		0.29
93	24.04	35.04	23.68		0.30
124	23.36	35.11	23.92		0.26
154	22.02	35.27	24.44		0.25
207	19.92	35.14	24.91		0.39
259	17.73	34.85	25.24		0.51
309	14.60	34.44	25.65		0.72
361	11.48	34.17	26.06		1.18
413	09.80	34.09	26.30		1.42
515	07.22	34.07	26.68		2.24

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.19	35.00	23.00	0.000	1.498
10	25.99	35.01	23.07	0.048	1.450
20	25.78	35.00	23.12	0.096	1.402
30	25.53	34.96	23.17	0.144	1.354
50	25.20	34.96	23.27	0.237	1.261
75	24.55	34.99	23.49	0.351	1.147
100	23.78	35.06	23.77	0.458	1.040
150	22.24	35.26	24.37	0.653	0.845
200	20.02	35.16	24.90	0.822	0.676
250	18.20	34.91	25.17	0.973	0.525
300	15.41	34.53	25.54	1.109	0.389
400	10.17	34.10	26.24	1.329	0.169
500	07.60	34.07	26.62	1.498	0.000

STATION 45

M/V Hugh M. Smith: Cruise 21, 21°37'N, 160°14'W, August 18, 1953. Messenger time: 1844 GCT. Weather: 80, cloud coverage 3. Wind: 080°, 21 kt. Sea: 3-5 ft. Wire angle: 09°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.87	35.03	23.12		0.33
25	25.70	35.03	23.17		0.32
55	25.02	34.97	23.33		0.27
91	23.00	35.17	24.08		0.27
111	22.46	35.20	24.26		0.31
141	21.82	35.26	24.49		0.25
182	20.28	35.15	24.82		0.40
233	18.37	34.90	25.12		0.49
264	15.70	34.52	25.46		0.83
319	12.54	34.22	25.90		1.21
364	10.69	34.11	26.16		1.55
425	08.46	34.08	26.50		2.06
531	06.78	34.10	26.76		2.46

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.87	35.03	23.12	0.000	1.422
10	25.81	35.03	23.14	0.048	1.374
20	25.74	35.03	23.16	0.095	1.327
30	25.63	35.02	23.18	0.142	1.280
50	25.19	34.98	23.29	0.235	1.187
75	23.88	35.06	23.74	0.346	1.076
100	22.81	35.18	24.14	0.446	0.976
150	21.64	35.26	24.54	0.628	0.794
200	19.60	35.08	24.95	0.792	0.630
250	16.58	34.63	25.35	0.937	0.485
300	13.50	34.30	25.77	1.062	0.360
400	09.18	34.08	26.39	1.264	0.158
500	07.20	34.10	26.70	1.422	0.000

STATION 46

M/V Hugh M. Smith: Cruise 21, 21°09'N, 159°48'W, August 19, 1953. Messenger time: 0053 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 17 kt. Sea: 3-5 ft. Wire angle: 33°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	26.18	35.08	23.06		0.33
16	26.01	35.05	23.09		0.32
34	25.96	35.05	23.10		0.33
41	25.86	35.07	23.15		0.30
54	23.62	35.06	23.82		0.31
76	22.68	35.12	24.14		0.26
100	21.37	35.13	24.51		0.30
124	20.60	35.10	24.70		0.40
164	19.06	34.96	24.99		0.53
204	16.90	34.66	25.29		0.51
245	15.06	34.43	25.54		0.97
326	11.24	34.14	26.08		1.39
408	08.34	34.06	26.51		2.11

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.18	35.08	23.06	0.000	1.330
10	26.08	35.06	23.07	0.048	1.282
20	26.00	35.05	23.09	0.096	1.234
30	25.99	35.05	23.10	0.144	1.186
50	24.70	35.06	23.50	0.236	1.094
75	22.70	35.12	24.13	0.339	0.991
100	21.37	35.13	24.51	0.430	0.900
150	19.55	35.02	24.91	0.595	0.735
200	17.00	34.67	25.28	0.741	0.589
250	14.82	34.41	25.58	0.873	0.457
300	12.40	34.20	25.91	0.989	0.341
400	08.59	34.06	26.47	1.180	0.150
500	06.80	34.12	26.77	1.330	0.000

STATION 47

M/V Hugh M. Smith: Cruise 21, 20°50'N, 159°13'W, August 19, 1953. Messenger time: 0814 GCT. Weather: 03, cloud coverage not recorded. Wind: 070°, 24 kt. Sea: 5-8 ft. Wire angle: 26°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.05	35.07	23.09		0.30
18	26.04	35.10	23.11		0.31
35	25.78	35.15	23.23		0.26
45	25.52	35.13	23.30		0.26
54	23.34	35.10	23.93		0.27
80	21.89	35.14	24.37		0.26
109	20.48	35.09	24.72		0.36
136	18.99	34.94	25.00		0.49
181	17.08	34.69	25.28		0.70
227	14.92	34.42	25.56		0.93
273	12.36	34.20	25.92		1.26
364	08.68	34.08	26.47		2.01
458	06.84	34.12	26.77		2.60

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.05	35.07	23.09	0.000	1.260
10	26.05	35.08	23.10	0.048	1.212
20	26.03	35.11	23.13	0.096	1.164
30	25.88	35.15	23.21	0.143	1.117
50	23.80	35.10	23.80	0.231	1.029
75	22.18	35.13	24.29	0.329	0.931
100	21.09	35.13	24.59	0.417	0.843
150	18.32	34.85	25.10	0.575	0.685
200	16.41	34.61	25.37	0.715	0.545
250	13.59	34.29	25.74	0.840	0.420
300	11.00	34.13	26.12	0.947	0.313
400	07.89	34.09	26.60	1.122	0.138
500	06.20	34.15	26.88	1.260	0.000

STATION 48

M/V Hugh M. Smith: Cruise 21, 20°21'N, 158°41'W, August 19, 1953. Messenger time: 1620 GCT. Weather: 02, cloud coverage 6. Wind: 080°, 21 kt. Sea: 5-8 ft. Wire angle: 15°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	25.79	34.91	23.05		0.36
25	25.80	34.90	23.04		0.37
50	25.01	34.83	23.23		0.33
79	24.92	34.85	23.27		0.35
109	24.77	34.86	23.33		0.34
138	22.74	35.10	24.10		0.39
168	20.86	35.07	24.60		0.41
218	17.98	34.77	25.12		0.67
267	15.20	34.46	25.53		0.93
317	12.56	34.21	25.89		1.25
366	10.18	34.09	26.23		1.49
421	08.57	34.05	26.46		1.95
525	06.74	34.14	26.80		2.75

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.79	34.91	23.05	0.000	1.475
10	25.80	34.91	23.05	0.048	1.427
20	25.80	34.90	23.04	0.097	1.378
30	25.42	34.85	23.12	0.145	1.330
50	25.01	34.83	23.23	0.239	1.236
75	24.94	34.85	23.27	0.356	1.119
100	24.81	34.86	23.31	0.471	1.004
150	21.87	35.12	24.37	0.677	0.798
200	19.21	34.90	24.91	0.846	0.629
250	16.20	34.57	25.39	0.991	0.484
300	13.40	34.28	25.77	1.115	0.360
400	09.12	34.05	26.38	1.318	0.157
500	07.14	34.11	26.72	1.475	0.000

STATION 49

M/V Hugh M. Smith: Cruise 21, 19°56'N, 158°11'W, August 19, 1953. Messenger time: 2253 GCT. Weather: 02, cloud coverage 2. Wind: 070°, 16 kt. Sea: 5-8 ft. Wire angle: 20°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.68	34.99	23.14		0.31
32	25.54	35.01	23.20		0.28
61	25.30	35.01	23.28		0.25
91	25.10	35.09	23.40		0.25
120	24.12	35.09	23.70		0.30
135	23.12	35.17	24.05		0.25
149	22.52	35.23	24.27		0.25
200	20.76	35.17	24.71		0.35
249	18.60	35.00	25.14		0.51
300	15.38	34.59	25.59		0.86
349	11.63	34.26	26.10		1.51
401	09.60	34.16	26.38		1.75
499	07.66	34.22	26.73		2.41

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.68	34.99	23.15	0.000	1.504
10	25.61	35.00	23.18	0.047	1.457
20	25.56	35.01	23.20	0.094	1.410
30	25.54	35.01	23.20	0.141	1.363
50	25.49	35.01	23.22	0.235	1.269
75	25.21	35.05	23.34	0.351	1.153
100	25.06	35.10	23.42	0.464	1.040
150	22.47	35.23	24.28	0.670	0.834
200	20.76	35.17	24.71	0.846	0.658
250	18.54	34.99	25.15	1.001	0.503
300	15.38	34.59	25.59	1.136	0.368
400	09.61	34.16	26.38	1.348	0.156
500	07.65	34.22	26.73	1.504	0.000

STATION 50

M/V Hugh M. Smith: Cruise 21, 19°26'N, 157°39'W, August 20, 1953. Messenger time: 0611 GCT. Weather: 02, cloud coverage 8. Wind: 090°, 8 kt. Sea: 5-8 ft. Wire angle: 13°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.79	34.91	23.05		0.37
15	25.80	34.93	23.06		0.39
35	25.81	34.92	23.05		0.40
51	25.27	34.98	23.27		0.39
77	24.87	34.85	23.29		0.39
103	24.27	35.21	23.74		0.28
128	22.74	35.16	24.15		0.31
153	22.34	35.18	24.27		0.35
206	19.84	35.06	24.87		0.50
258	16.60	34.70	25.40		0.76
309	13.54	34.29	25.75		1.20
413	09.04	34.11	26.43		2.00
516	06.91	34.16	26.79		2.70

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	25.79	34.91	23.05	0.000	1.480
10	25.80	34.92	23.06	0.048	1.432
20	25.80	34.93	23.06	0.096	1.384
30	25.81	34.92	23.05	0.145	1.335
50	25.30	34.98	23.26	0.240	1.240
75	24.90	34.85	23.28	0.356	1.124
100	24.35	35.20	23.71	0.467	1.013
150	22.40	35.18	24.26	0.666	0.814
200	20.00	35.07	24.83	0.839	0.641
250	17.26	34.78	25.30	0.988	0.492
300	14.14	34.36	25.68	1.116	0.364
400	09.42	34.11	26.37	1.323	0.157
500	07.23	34.15	26.74	1.480	0.000

STATION 51

M/V Hugh M. Smith: Cruise 21, 19°01'N, 157°10'W, August 20, 1953. Messenger time: first cast 1231 GCT, second cast 1245 GCT. Weather: 02, cloud coverage 7. Wind: 110°, 27 kt. Sea: 5-8 ft. Wire angle: first cast 30°, second cast 30°. Depth of water: 2000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.83	35.08	23.47		0.32
18	24.84	35.14	23.51		0.31
31	24.81	35.13	23.52		0.28
51	22.76	35.12	24.11		0.29
68	21.92	35.07	24.31		0.35
90	21.13	35.06	24.52		0.33
115	20.48	35.07	24.70		0.45
140	19.80	35.03	24.85		0.47
185	18.08	34.79	25.11		0.59
234	15.14	34.43	25.52		0.87
283	11.90	34.21	26.02		1.41
382	08.68	34.13	26.51		2.21
477	06.97	34.17	26.79		2.81

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.83	35.08	23.47	0.000	1.266
10	24.83	35.11	23.50	0.044	1.222
20	24.84	35.14	23.52	0.088	1.178
30	24.81	35.13	23.52	0.132	1.134
50	22.80	35.12	24.10	0.214	1.052
75	21.66	35.06	24.38	0.307	0.959
100	20.86	35.06	24.60	0.394	0.872
150	19.62	35.01	24.89	0.557	0.709
200	17.57	34.71	25.17	0.707	0.559
250	14.26	34.35	25.65	0.839	0.427
300	11.26	34.18	26.11	0.949	0.317
400	08.30	34.13	26.57	1.125	0.141
500	06.60	34.19	26.86	1.266	0.000

STATION 52

M/V Hugh M. Smith: Cruise 21, 18°35'N, 156°34'W, August 20, 1953. Messenger time: 2135 GCT. Weather: 02, cloud coverage 2. Wind: 090°, 14 kt. Sea: 5-8 ft. Wire angle: 26°. Depth of water: 1800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.28	34.94	23.23		0.39
24	25.22	34.93	23.24		0.38
47	25.22	34.96	23.26		0.35
66	24.87	34.98	23.38		0.33
77	23.82	35.07	23.77		0.32
87	23.06	35.08	24.00		0.29
114	21.52	35.11	24.45		0.35
144	20.30	35.03	24.72		0.37
190	18.88	34.93	25.02		0.46
240	16.09	34.53	25.39		0.79
288	12.17	34.18	25.94		1.35
384	08.34	34.08	26.52		2.14
483	06.84	34.18	26.82		2.77

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.28	34.94	23.23	0.000	1.346
10	25.25	34.94	23.24	0.047	1.299
20	25.23	34.93	23.24	0.093	1.253
30	25.22	34.94	23.25	0.140	1.206
50	25.22	34.96	23.27	0.232	1.114
75	23.92	35.06	23.73	0.343	1.003
100	22.33	35.11	24.23	0.442	0.904
150	20.11	35.02	24.77	0.617	0.729
200	18.60	34.90	25.07	0.772	0.574
250	15.30	34.44	25.49	0.911	0.435
300	11.49	34.14	26.04	1.026	0.320
400	08.04	34.09	26.57	1.206	0.140
500	06.66	34.21	26.86	1.346	0.000

STATION 53

M/V Hugh M. Smith: Cruise 21, 18°07'N, 156°02'W, August 21, 1953. Messenger time: 0420 GCT. Weather: 02, cloud coverage 1. Wind: 090°, 19 kt. Sea: 5-8 ft. Wire angle: 19°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	24.89	34.88	23.30		0.33
30	24.90	34.84	23.27		0.36
60	24.82	34.88	23.32		0.33
81	24.77	34.95	23.39		0.36
100	23.97	34.94	23.62		0.35
120	22.80	35.06	24.06		0.25
151	21.12	34.87	24.38		0.37
200	19.23	34.95	24.94		0.38
250	15.34	34.41	25.46		0.94
302	11.92	34.20	26.00		1.40
353	09.57	34.10	26.34		1.88
403	08.22	34.08	26.54		2.23
503	06.74	34.24	26.88		2.85

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	24.89	34.88	23.31	0.000	1.408
10	24.89	34.87	23.30	0.046	1.362
20	24.90	34.86	23.29	0.092	1.316
30	24.90	34.84	23.27	0.138	1.270
50	24.85	34.86	23.30	0.230	1.178
75	24.78	34.94	23.38	0.345	1.063
100	23.97	34.94	23.63	0.455	0.953
150	21.13	34.87	24.38	0.653	0.755
200	19.23	34.95	24.94	0.821	0.587
250	15.34	34.41	25.46	0.963	0.445
300	12.00	34.20	25.99	1.081	0.327
400	08.30	34.08	26.53	1.265	0.143
500	06.79	34.23	26.86	1.408	0.000

STATION 54

M/V Hugh M. Smith: Cruise 21, 17°39'N, 155°31'W, August 21, 1953. Messenger time: 1234 GCT. Weather: 02, cloud coverage 4. Wind: 080°, 17 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.01	34.99	23.35		0.31
25	25.04	34.99	23.34		0.29
50	24.99	35.05	23.40		0.31
73	23.26	35.16	24.00		0.24
94	22.19	35.17	24.31		0.31
115	21.92	35.20	24.41		0.26
142	20.54	35.21	24.79		0.34
193	18.29	34.94	25.17		0.51
239	15.14	34.45	25.54		0.95
290	11.78	34.23	26.05		1.47
342	09.98	34.25	26.39		2.21
391	09.33	34.30	26.54		2.51
487	07.12	34.25	26.83		2.81

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.01	34.99	23.35	0.000	1.305
10	25.02	34.99	23.35	0.045	1.260
20	25.03	34.99	23.35	0.091	1.214
30	25.03	35.00	23.35	0.136	1.169
50	24.99	35.05	23.40	0.227	1.078
75	23.16	35.16	24.03	0.332	0.973
100	22.10	35.18	24.35	0.427	0.878
150	20.20	35.19	24.87	0.596	0.709
200	18.01	34.89	25.20	0.745	0.560
250	14.40	34.36	25.63	0.877	0.428
300	11.31	34.22	26.13	0.987	0.318
400	09.18	34.30	26.56	1.163	0.142
500	06.80	34.23	26.86	1.305	0.000

STATION 55

M/V Hugh M. Smith: Cruise 21, 17°19'N, 156°12'W, August 21, 1953. Messenger time: 1855 GCT. Weather: 02, cloud coverage 5. Wind: 060°, 16 kt. Sea: 5-8 ft. Wire angle: 19°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.99	34.88	23.27		0.43
27	25.00	34.88	23.27		0.46
56	25.02	34.96	23.32		0.38
67	24.55	34.89	23.41		0.41
76	24.48	34.94	23.47		0.37
92	23.64	34.88	23.68		0.33
123	21.90	35.07	24.32		0.38
152	21.14	34.98	24.46		0.36
205	18.82	34.93	25.03		0.52
256	14.82	34.42	25.58		1.08
305	11.36	34.16	26.07		1.66
407	08.28	34.25	26.66		2.57
508	06.37	34.21	26.90		2.94

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	24.99	34.88	23.27	0.000	1.375
10	25.00	34.88	23.27	0.046	1.329
20	25.00	34.88	23.27	0.092	1.283
30	25.00	34.88	23.27	0.139	1.236
50	25.02	34.94	23.31	0.231	1.144
75	24.50	34.94	23.47	0.344	1.031
100	23.15	34.91	23.84	0.451	0.924
150	21.10	34.98	24.47	0.642	0.733
200	19.00	34.93	24.99	0.806	0.569
250	15.42	34.48	25.50	0.947	0.428
300	11.61	34.16	26.03	1.062	0.313
400	08.41	34.24	26.64	1.239	0.136
500	06.49	34.22	26.89	1.375	0.000

STATION 56

M/V Hugh M. Smith: Cruise 21, 17°45'N, 156°40'W, August 22, 1953. Messenger time: 0055 GCT. Weather: 02, cloud coverage 2. Wind: 070°, 13 kt. Sea: 3-5 ft. Wire angle: 13°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.13	34.89	23.24		0.37
26	25.04	34.86	23.24		0.37
55	24.97	34.88	23.28		0.39
71	24.06	34.88	23.55		0.29
87	23.46	34.96	23.79		0.29
102	22.84	35.13	24.10		0.27
122	21.49	34.97	24.36		0.34
122	21.49	35.12	24.47		-
153	20.46	35.08	24.72		0.40
202	18.56	34.86	25.04		0.56
255	15.73	34.50	25.44		0.80
306	12.01	34.16	25.96		1.43
408	08.99	34.19	26.51		2.26
511	06.50	34.17	26.85		2.91

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.13	34.89	23.24	0.000	1.386
10	25.09	34.88	23.24	0.046	1.340
20	25.06	34.87	23.25	0.093	1.293
30	25.02	34.87	23.26	0.139	1.247
50	24.99	34.88	23.27	0.232	1.154
75	23.68	34.91	23.69	0.343	1.043
100	23.00	35.11	24.04	0.445	0.941
150	20.60	35.08	24.68	0.626	0.760
200	18.68	34.88	25.03	0.784	0.602
250	16.00	34.53	25.41	0.926	0.460
300	12.37	34.18	25.90	1.047	0.339
400	09.20	34.19	26.47	1.238	0.148
500	06.76	34.18	26.83	1.386	0.000

STATION 57

M/V Hugh M. Smith: Cruise 21, 18°13'N, 157°09'W, August 22, 1953. Messenger time: 0755 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 15 kt. Sea: 3-5 ft. Wire angle: 26°. Depth of water: 1700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.87	34.89	23.01		0.36
22	25.70	34.96	23.12		0.35
44	25.12	35.06	23.37		0.27
65	23.75	35.25	23.93		0.22
92	22.45	35.20	24.26		0.29
114	21.46	35.17	24.52		0.31
141	20.58	35.08	24.69		0.40
159	19.19	34.96	24.96		0.52
186	17.94	34.86	25.20		0.68
186	-	-	-		0.56
223	15.52	34.53	25.51		0.86
260	13.38	34.29	25.78		1.17
332	09.67	34.13	26.35		1.94
406	07.78	34.14	26.65		2.46

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.87	34.89	23.01	0.000	1.302
10	25.80	34.92	23.06	0.048	1.254
20	25.71	34.95	23.11	0.096	1.206
30	25.59	34.98	23.17	0.144	1.158
50	24.91	35.10	23.47	0.236	1.066
75	23.08	35.22	24.10	0.340	0.962
100	22.21	35.19	24.32	0.433	0.869
150	19.92	35.02	24.82	0.604	0.698
200	17.00	34.75	25.34	0.752	0.550
250	13.98	34.35	25.71	0.879	0.423
300	11.22	34.16	26.10	0.987	0.315
400	07.90	34.14	26.63	1.161	0.141
500	06.80	34.14	26.79	1.302	0.000

STATION 58

M/V Hugh M. Smith: Cruise 21, 18°47'N, 157°46'W, August 22, 1953. Messenger time: 1617 GCT. Weather: 02, cloud coverage 3. Wind: 100, 11 kt. Sea: 1-3 ft. Wire angle: 07°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.77	34.82	22.99		0.44
10	25.77	34.88	23.04		0.38
33	25.34	34.88	23.17		0.35
65	24.92	34.86	23.28		0.39
98	24.58	34.83	23.36		0.36
112	23.25	35.01	23.89		0.33
128	21.85	35.14	24.38		0.34
161	20.27	35.19	24.85		0.43
213	18.42	34.97	25.16		0.56
267	15.76	34.52	25.45		0.83
320	12.48	34.15	25.86		1.21
428	07.85	34.09	26.60		2.39
534	06.52	34.08	26.78		2.84

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.77	34.82	22.99	0.000	1.442
10	25.77	34.88	23.04	0.049	1.393
20	25.50	34.88	23.12	0.097	1.345
30	25.34	34.88	23.17	0.144	1.298
50	25.10	34.87	23.23	0.238	1.204
75	24.81	34.84	23.30	0.354	1.088
100	24.54	34.83	23.37	0.469	0.973
150	20.80	35.20	24.72	0.665	0.777
200	18.98	35.05	25.08	0.821	0.621
250	17.02	34.73	25.32	0.964	0.478
300	13.61	34.25	25.71	1.091	0.351
400	08.60	34.09	26.49	1.291	0.151
500	06.90	34.08	26.73	1.442	0.000

STATION 59

M/V Hugh M. Smith: Cruise 21, 19°13'N, 158°20'W, August 22, 1953. Messenger time: 2212 GCT. Weather: 02, cloud coverage 2. Wind: 120°, 5 kt. Sea: < 1 ft. Wire angle: 13°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.00	34.95	23.02		0.41
10	25.86	34.96	23.07		0.37
23	25.53	34.92	23.14		0.37
40	25.34	34.93	23.21		0.40
60	24.96	34.88	23.29		0.40
89	24.65	34.89	23.38		0.39
119	23.79	34.98	23.71		0.35
148	22.30	35.20	24.30		0.36
199	19.73	35.09	24.92		0.47
247	16.98	34.73	25.33		0.80
298	12.84	34.34	25.93		1.39
398	09.22	34.32	26.57		2.46
498	07.34	34.25	26.80		2.82

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.00	34.95	23.02	0.000	1.433
10	25.86	34.96	23.07	0.048	1.385
20	25.65	34.93	23.11	0.096	1.337
30	25.42	34.92	23.17	0.144	1.289
50	25.22	34.92	23.24	0.238	1.195
75	24.78	34.88	23.34	0.353	1.080
100	24.52	34.90	23.43	0.467	0.966
150	22.20	35.20	24.33	0.671	0.762
200	19.68	35.09	24.93	0.840	0.593
250	16.65	34.69	25.38	0.984	0.449
300	12.78	34.34	25.94	1.105	0.328
400	09.19	34.32	26.58	1.290	0.143
500	07.30	34.25	26.81	1.433	0.000

STATION 60

M/V Hugh M. Smith: Cruise 21, 19°38'N, 158°52'W, August 23, 1953. Messenger time: 0508 GCT. Weather: 02, cloud coverage 1. Wind: Light and variable. Sea: < 1 ft. Wire angle: 07°. Depth of water: 2000 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.05	34.88	22.95		0.42
15	25.38	34.96	23.21		0.28
35	25.08	34.94	23.29		0.25
55	24.96	34.95	23.33		0.21
75	24.70	34.93	23.40		0.37
100	24.53	34.99	23.50		0.29
132	23.55	35.06	23.84		0.30
156	22.42	35.26	24.31		0.31
188	20.95	35.26	24.72		0.36
246	17.84	34.96	25.30		0.61
306	13.20	-	-		-
409	09.34	34.38	26.62		2.47
512	07.18	34.39	26.94		3.09

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.05	34.88	22.95	0.000	1.434
10	25.45	34.95	23.19	0.048	1.386
20	25.29	34.96	23.24	0.095	1.339
30	25.13	34.94	23.28	0.141	1.293
50	25.00	34.95	23.32	0.233	1.201
75	24.70	34.93	23.40	0.347	1.087
100	24.53	34.99	23.50	0.459	0.975
150	22.80	35.18	24.15	0.666	0.768
200	20.41	35.23	24.85	0.841	0.593
250	17.50	34.92	25.35	0.989	0.445
300	13.55	34.59	25.98	1.109	0.325
400	09.60	34.38	26.56	1.294	0.140
500	07.38	34.39	26.91	1.434	0.000

STATION 61

M/V Hugh M. Smith: Cruise 21, 20°05'N, 159°15'W, August 23, 1953. Messenger time: 1045 GCT. Weather: 02, cloud coverage 3. Wind: 050°, 9 kt. Sea: 1-3 ft. Wire angle: 07°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.30	34.98	22.94		0.37
20	26.12	34.97	22.99		0.33
51	26.00	34.93	23.00		0.40
84	25.80	35.09	23.18		0.38
104	24.51	35.07	23.56		0.37
125	22.74	35.07	24.08		0.39
155	21.49	35.13	24.48		0.32
208	19.20	35.03	25.01		0.51
260	14.69	34.44	25.63		1.10
313	11.26	34.23	26.15		1.81
365	09.46	34.14	26.39		1.88
417	08.03	34.11	26.59		2.13
521	06.33	34.13	26.84		2.93

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	26.30	34.98	22.95	0.000	1.434
10	26.24	34.98	22.96	0.049	1.385
20	26.12	34.97	22.99	0.098	1.336
30	26.10	34.96	22.99	0.147	1.287
50	26.01	34.93	23.00	0.245	1.189
75	25.87	34.98	23.08	0.367	1.067
100	24.67	35.07	23.51	0.482	0.952
150	21.68	35.13	24.43	0.682	0.752
200	19.61	35.06	24.93	0.849	0.585
250	15.65	34.54	25.49	0.991	0.443
300	12.00	34.27	26.04	1.106	0.328
400	08.45	34.11	26.53	1.288	0.146
500	06.68	34.12	26.79	1.434	0.000

STATION 62

M/V Hugh M. Smith: Cruise 21, 20°31'N, 159°49'W, August 23, 1953. Messenger time: 1724 GCT. Weather: 02, cloud coverage 3. Wind: 090°, 8 kt. Sea: < 1 ft. Wire angle: 07°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
03	26.08	35.14	23.14		0.38
24	26.00	35.15	23.17		0.40
44	25.94	35.15	23.19		0.36
65	24.02	35.12	23.75		0.34
86	22.78	35.20	24.17		0.34
107	22.11	35.22	24.37		0.35
127	20.94	35.19	24.67		0.36
158	19.00	35.02	25.05		0.55
209	15.50	34.57	25.55		0.90
261	12.02	34.26	26.03		1.24
313	10.23	34.18	26.29		1.76
416	07.75	34.11	26.63		2.34
519	06.47	34.19	26.87		2.90

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.08	35.14	23.14	0.000	1.276
10	26.08	35.14	23.14	0.047	1.229
20	26.05	35.15	23.15	0.095	1.181
30	25.99	35.15	23.17	0.142	1.134
50	25.90	35.15	23.20	0.236	1.040
75	23.30	35.15	23.98	0.345	0.931
100	22.38	35.22	24.30	0.440	0.836
150	19.52	35.07	24.96	0.609	0.667
200	15.95	34.62	25.49	0.749	0.527
250	12.42	34.28	25.97	0.866	0.410
300	10.68	34.20	26.23	0.965	0.311
400	08.05	34.11	26.59	1.135	0.141
500	06.69	34.17	26.83	1.276	0.000

STATION 63

M/V Hugh M. Smith: Cruise 21, 20°49'N, 160°27'W, August 24, 1953. Messenger time: 0019 GCT. Weather: 02, cloud coverage 4. Wind: 080°, 16 kt. Sea: 1-3 ft. Wire angle: 10°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	26.43	35.11	23.00		0.37
22	26.00	35.09	23.12		0.36
48	25.83	35.05	23.14		0.29
66	23.99	35.12	23.75		0.30
85	23.04	35.22	24.11		0.29
105	22.26	35.26	24.36		0.30
126	21.38	35.22	24.57		0.41
155	20.10	35.14	24.86		0.50
206	17.06	34.75	25.33		0.72
257	14.34	34.43	25.69		0.99
312	11.53	34.19	26.07		1.61
412	08.46	34.09	26.51		2.17

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.43	35.11	23.00	0.000	1.345
10	26.05	35.09	23.11	0.048	1.297
20	26.00	35.09	23.12	0.096	1.249
30	25.99	35.09	23.13	0.144	1.201
50	25.50	35.04	23.24	0.238	1.107
75	23.57	35.16	23.91	0.347	0.998
100	22.50	35.26	24.29	0.443	0.902
150	20.35	35.15	24.80	0.615	0.730
200	17.12	34.75	25.31	0.764	0.581
250	14.80	34.48	25.63	0.893	0.452
300	12.01	34.22	26.00	1.006	0.339
400	08.77	34.10	26.47	1.192	0.153
500	07.10	34.10	26.72	1.345	0.000

STATION 64

M/V Hugh M. Smith: Cruise 21, 21°24'N, 160°59'W, August 24, 1953. Messenger time: 0655 GCT. Weather: 02, cloud coverage 7. Wind: 090°, 11 kt. Sea: 1-3 ft. Wire angle: 13°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.40	35.09	23.00		0.34
14	26.23	35.10	23.05		0.30
30	25.77	35.06	23.18		0.31
50	25.41	35.02	23.25		0.28
70	24.90	35.06	23.44		0.28
91	24.05	35.06	23.69		0.28
121	22.58	35.16	24.20		0.34
152	21.97	35.28	24.46		0.33
202	20.40	35.26	24.87		0.39
252	16.16	34.65	25.46		0.73
303	12.78	34.30	25.91		1.22
403	09.62	34.13	26.35		1.82
504	07.42	34.13	26.69		2.54

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.40	35.09	23.00	0.000	1.445
10	26.35	35.09	23.01	0.049	1.396
20	26.01	35.08	23.11	0.097	1.348
30	25.77	35.06	23.17	0.144	1.301
50	25.41	35.02	23.25	0.238	1.207
75	24.70	35.06	23.50	0.352	1.093
100	23.62	35.07	23.83	0.459	0.986
150	22.00	35.27	24.44	0.650	0.795
200	20.55	35.28	24.85	0.819	0.626
250	16.50	34.69	25.41	0.965	0.480
300	12.92	34.31	25.89	1.086	0.359
400	09.70	34.13	26.34	1.284	0.161
500	07.51	34.13	26.68	1.445	0.000

STATION 65

M/V Hugh M. Smith: Cruise 21, 21°46'N, 161°27'W, August 24, 1953. Messenger time: 1310 GCT. Weather: 02, cloud coverage 5. Wind: 060°, 9 kt. Sea: 1-3 ft. Wire angle: 02°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.29	35.06	23.01		0.40
10	26.31	35.08	23.02		0.39
27	26.18	35.07	23.05		0.29
42	26.07	35.06	23.07		0.30
63	25.28	35.00	23.27		0.34
94	23.81	35.15	23.83		0.29
125	22.91	35.21	24.14		0.31
155	22.05	35.35	24.48		0.25
206	20.10	35.24	24.93		0.39
258	17.66	34.88	25.28		0.46
309	14.38	34.43	25.68		0.87
413	09.84	34.14	26.33		1.58
514	07.34	34.08	26.67		2.51

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.29	35.06	23.01	0.000	1.486
10	26.31	35.08	23.02	0.049	1.437
20	26.20	35.07	23.04	0.097	1.389
30	26.14	35.07	23.06	0.145	1.341
50	25.75	35.03	23.15	0.241	1.245
75	24.52	35.05	23.54	0.355	1.131
100	23.60	35.16	23.90	0.461	1.025
150	22.22	35.33	24.43	0.651	0.835
200	20.34	35.27	24.90	0.819	0.667
250	18.14	34.95	25.22	0.968	0.518
300	14.88	34.49	25.62	1.101	0.385
400	10.34	34.15	26.25	1.317	0.169
500	07.67	34.08	26.62	1.486	0.000

STATION 66

M/V Hugh M. Smith: Cruise 21, 21°49'N, 157°33'W, August 26, 1953. Messenger time: 0119 GCT. Weather: 02, cloud coverage 3. Wind: 090°, 23 kt. Sea: 5-8 ft. Wire angle: 19°. Depth of water: 1500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.40	35.00	23.24		0.32
20	25.40	35.02	23.25		0.29
46	25.34	35.02	23.27		0.30
61	25.06	35.12	23.43		0.27
77	24.38	35.23	23.72		0.22
92	23.40	35.34	24.10		0.20
121	22.10	35.26	24.41		0.30
151	21.22	35.31	24.69		0.32
202	20.04	35.22	24.94		0.34
251	16.80	34.81	25.43		0.55
302	14.96	34.49	25.61		0.71
402	09.52	34.11	26.36		1.65
502	07.34	34.13	26.71		2.37

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.40	35.00	23.24	0.000	1.430
10	25.40	35.01	23.25	0.046	1.384
20	25.40	35.02	23.26	0.093	1.337
30	25.39	35.02	23.26	0.139	1.291
50	25.30	35.03	23.29	0.232	1.198
75	24.48	35.20	23.67	0.343	1.087
100	23.08	35.31	24.17	0.443	0.987
150	21.29	35.30	24.66	0.622	0.808
200	20.12	35.22	24.92	0.784	0.646
250	16.82	34.81	25.43	0.927	0.503
300	15.02	34.49	25.59	1.056	0.374
400	09.61	34.10	26.34	1.269	0.161
500	07.39	34.12	26.69	1.430	0.000

STATION 67

M/V Hugh M. Smith: Cruise 21, 21°22'N, 157°33'W, August 26, 1953. Messenger time: 0603 GCT. Weather: 03, cloud coverage 3. Wind: 090°, 23 kt. Sea: 5-8 ft. Wire angle: 19°. Depth of water: 350 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.26	34.94	23.24		0.35
24	25.27	34.90	23.20		0.34
48	25.23	34.96	23.26		0.33
67	24.41	34.99	23.53		0.25
91	23.50	34.97	23.79		0.27
117	22.39	35.10	24.20		0.30
143	21.46	35.21	24.55		0.27
168	20.96	35.17	24.65		0.28
201	20.40	35.20	24.82		0.34
235	19.90	35.10	24.88		0.33
292	17.15	34.62	25.21		0.56
399	09.86	34.10	26.29		1.85
501	06.98	34.01	26.66		2.75

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.26	34.94	23.24	0.000	1.502
10	25.26	34.93	23.23	0.047	1.455
20	25.27	34.91	23.21	0.093	1.409
30	25.26	34.92	23.22	0.140	1.362
50	25.20	34.97	23.28	0.233	1.269
75	23.98	34.97	23.65	0.344	1.158
100	23.31	34.98	23.85	0.449	1.053
150	21.30	35.21	24.59	0.637	0.865
200	20.41	35.20	24.82	0.802	0.700
250	19.50	35.01	24.92	0.961	0.541
300	16.60	34.56	25.29	1.109	0.393
400	09.80	34.10	26.30	1.338	0.164
500	07.00	34.01	26.66	1.502	0.000

STATION 68

M/V Hugh M. Smith: Cruise 21, 21°02'N, 157°32'W, August 26, 1953. Messenger time: 1014 GCT. Weather: 02, cloud coverage 2. Wind: 050°, 24 kt. Sea: 3-5 ft. Wire angle: 02°. Depth of water: 30 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.61	34.88	23.08		0.32
09	25.62	34.90	23.09		0.33
19	25.60	34.92	23.12		0.31
35	24.78	34.88	23.34		0.30

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)

STATION 69

M/V Hugh M. Smith: Cruise 21, 20°33'N, 157°29'W, August 26, 1953. Messenger time: 1535 GCT. Weather: 02, cloud coverage 1. Wind: 080°, 9 kt. Sea: 5-8 ft. Wire angle: 05°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.90	34.93	23.03		0.27
21	25.88	34.91	23.02		0.27
38	25.01	34.90	23.28		0.27
58	24.54	34.92	23.44		0.26
78	23.43	34.97	23.81		0.25
105	22.58	-	-		0.25
131	21.46	35.07	24.44		0.33
157	20.68	34.99	24.59		0.44
210	18.78	34.90	25.02		0.51
261	16.21	34.48	25.32		0.68
313	12.73	34.11	25.77		1.18
415	08.80	33.95	26.35		1.95
519	06.76	34.03	26.71		2.72

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.90	34.93	23.03	0.000	1.453
10	25.89	34.92	23.03	0.048	1.405
20	25.88	34.91	23.02	0.097	1.356
30	25.40	34.90	23.16	0.145	1.308
50	24.71	34.91	23.38	0.238	1.215
75	23.62	34.96	23.74	0.347	1.106
100	22.85	35.01	24.00	0.448	1.005
150	20.99	35.02	24.53	0.634	0.819
200	19.20	34.92	24.93	0.798	0.655
250	16.80	34.58	25.26	0.946	0.507
300	13.60	34.18	25.66	1.076	0.377
400	09.21	33.95	26.28	1.288	0.165
500	07.09	34.02	26.66	1.453	0.000

STATION 5 [1/]

M/V Hugh M. Smith: Cruise 26, 20°33'N, 157°44'W, May 29, 1954. Messenger time: 1623 GCT. Weather: 02, cloud coverage 9. Wind: 070, 19 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.80	34.94	23.38		
23	24.76	34.94	23.39		
51	23.50	-	-		
103	20.62	35.08	24.68		
132	20.19	35.08	24.79		
159	19.60	35.05	24.92		
206	18.21	-	-		
310	11.32	34.16	26.08		
417	08.26	-	-		
522	06.88	34.22	26.84		
1007	05.15	34.38	27.19		

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.80	34.94	23.38	0.000	1.860
10	24.78	34.94	23.38	0.045	1.814
20	24.77	34.94	23.39	0.090	1.769
30	24.73	34.94	23.40	0.135	1.724
50	23.58	35.14	23.89	0.221	1.639
75	22.18	35.19	24.33	0.317	1.543
100	20.72	35.09	24.66	0.404	1.456
150	19.89	35.07	24.86	0.567	1.293
200	18.43	34.92	25.12	0.719	1.140
250	15.14	34.53	25.60	0.854	1.005
300	11.85	34.16	25.98	0.969	0.890
400	08.65	34.20	26.57	1.153	0.707
500	07.17	34.21	26.80	1.298	0.562
600	06.36	34.26	26.94	1.426	0.434
700	05.90	34.30	27.03	1.543	0.316
800	05.52	34.34	27.11	1.652	0.207
1000	05.18	34.38	27.19	1.860	0.000

1/ Hugh M. Smith cruise 26 was primarily a skipjack scouting cruise and, therefore, hydrographic observations, which started with station 5, were designated by odd numbers.

STATION 7

M/V Hugh M. Smith: Cruise 26, 19°45'N, 156°18'W, May 30, 1954. Messenger time: 1605 GCT. Weather: 02, cloud coverage 2. Wind: 290°, 11 kt. Sea: 1-3 ft. Wire angle: 17°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.48	-	-	4.56	
00	-	-	-	4.91	
09	25.48	34.69	22.98	5.30	
38	24.12	34.97	23.60	4.99	
38	-	-	-	4.74	
75	22.92	35.25	24.17	4.90	
113	22.00	-	-	4.65	
151	20.10	35.01	24.76	4.62	
195	18.66	34.92	25.06	4.38	
289	11.37	34.14	26.06	3.73	
389	08.60	34.18	26.56	2.49	
484	07.20	34.22	26.80	1.33	
484	07.14	-	26.81	-	
585	06.24	34.29	26.98	0.76	
772	05.14	34.45	27.24	0.77	
969	04.56	34.49	27.33	1.17	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.48	34.69	22.98	0.000	1.815
10	25.48	34.69	22.98	0.049	1.766
20	25.43	34.70	23.00	0.098	1.717
30	24.60	34.87	23.38	0.145	1.670
50	23.53	35.13	23.90	0.230	1.585
75	22.92	35.25	24.17	0.329	1.486
100	22.32	35.23	24.32	0.424	1.391
150	20.21	35.02	24.74	0.597	1.218
200	18.63	34.91	25.06	0.754	1.061
250	14.48	34.43	25.66	0.889	0.926
300	10.84	34.13	26.15	0.998	0.817
400	08.42	34.18	26.59	1.173	0.642
500	07.00	34.22	26.83	1.315	0.500
600	06.10	34.31	27.02	1.438	0.377
700	05.45	34.41	27.18	1.545	0.270
800	05.03	34.46	27.27	1.640	0.175
1000	04.45	34.49	27.36	1.815	0.000

STATION 9

M/V Hugh M. Smith: Cruise 26, 19°47'N, 157°23'W, June 2, 1954. Messenger time: 1610 GCT. Weather: 02, cloud coverage 6. Wind: 050°, 21 kt. Sea: 8-12 ft. Wire angle: 20°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	24.28	35.05	23.62	5.00	
24	24.28	35.07	23.63	4.91	
53	22.04	35.17	24.35	5.05	
87	20.34	35.03	24.71	4.83	
126	17.87	34.83	25.19	4.35	
165	15.55	34.52	25.50	4.42	
213	12.87	34.27	25.87	3.86	
322	08.78	34.20	26.55	2.63	
434	06.89	34.27	26.88	1.25	
541	06.06	34.34	27.05	0.86	
648	05.60	34.40	27.15	0.83	
859	04.68	34.51	27.35	0.89	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	24.28	35.05	23.62	0.000	
10	24.28	35.05	23.62	0.043	
20	24.28	35.06	23.59	0.086	
30	23.30	35.15	23.98	0.127	
50	22.25	35.18	24.30	0.203	
75	20.90	35.06	24.59	0.291	
100	19.77	34.99	24.83	0.373	
150	16.85	34.70	25.34	0.520	
200	13.39	34.31	25.80	0.644	
250	11.25	34.16	26.09	0.751	
300	09.37	34.18	26.44	0.842	
400	07.32	34.24	26.80	0.992	
500	06.32	34.31	26.99	1.122	
600	05.78	34.38	27.11	1.237	
700	05.39	34.43	27.20	1.337	
800	04.90	34.49	27.31	1.429	

STATION 11

M/V Hugh M. Smith: Cruise 26, 19°51'N, 158°43'W, June 3, 1954. Messenger time: 1556 GCT. Weather: 02, cloud coverage 6. Wind: 080°, 18 kt. Sea: 3-5 ft. Wire angle: 13°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.17	34.76	23.13	4.80	
11	25.17	34.76	23.13	4.83	
26	24.98	34.81	23.22	4.83	
57	24.20	35.07	23.65	4.88	
115	22.66	35.30	24.28	4.89	
171	20.57	35.26	24.82	4.72	
228	17.74	34.79	25.19	4.45	
343	10.22	34.18	26.29	3.18	
464	07.66	34.31	26.80	1.25	
580	06.41	34.31	26.98	0.95	
580	06.36	-	26.98	-	
694	05.69	34.42	27.15	0.71	
917	04.74	34.47	27.31	0.77	
1069	04.40	34.51	27.38	0.96	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.17	34.76	23.13	0.000	1.871
10	25.17	34.76	23.13	0.048	1.824
20	25.10	34.77	23.16	0.095	1.776
30	24.98	34.81	23.22	0.142	1.729
50	24.38	35.02	23.56	0.232	1.639
75	23.81	35.15	23.83	0.338	1.533
100	22.83	35.29	24.22	0.436	1.434
150	21.60	35.32	24.59	0.616	1.255
200	19.59	35.10	24.96	0.779	1.092
250	16.21	34.58	25.40	0.923	0.948
300	12.03	34.22	26.00	1.043	0.828
400	08.78	34.26	26.59	1.224	0.647
500	07.22	34.31	26.87	1.365	0.506
600	06.27	34.32	27.00	1.487	0.384
700	05.66	34.42	27.16	1.595	0.276
800	05.20	34.45	27.24	1.693	0.178
1000	04.54	34.50	27.35	1.871	0.000

STATION 13

M/V Hugh M. Smith: Cruise 26, 18°12'N, 158°51'W, June 4, 1954. Messenger time: 1545 GCT. Weather: 02, cloud coverage 4. Wind: 070°, 18 kt. Sea: 5-8 ft. Wire angle: 25°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.39	34.70	23.02	4.87	
37	25.41	34.70	23.01	4.84	
73	24.26	34.92	23.53	5.08	
114	22.73	35.26	24.23	5.00	
155	21.80	35.34	24.55	4.83	
201	19.61	35.07	24.93	4.58	
302	11.71	34.20	26.04	3.90	
408	08.88	34.33	26.63	1.80	
510	07.71	34.40	26.87	0.78	
613	06.74	34.43	27.03	0.59	
816	05.40	34.47	27.23	0.82	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.39	34.70	23.02	0.000	
10	25.39	34.70	23.02	0.049	
20	25.39	34.70	23.02	0.097	
30	25.40	34.70	23.01	0.146	
50	25.16	34.74	23.12	0.242	
75	24.20	34.93	23.55	0.357	
100	23.12	35.19	24.07	0.461	
150	21.92	35.34	24.52	0.646	
200	19.87	35.10	24.89	0.812	
250	15.42	34.50	25.52	0.955	
300	11.73	34.20	26.04	1.071	
400	09.03	34.33	26.61	1.250	
500	07.82	34.39	26.84	1.391	
600	06.87	34.43	27.01	1.514	
700	06.06	34.45	27.13	1.624	
800	05.44	34.47	27.22	1.724	

STATION 15

M/V Hugh M. Smith: Cruise 26, 16°16'N, 160°28'W, June 5, 1954. Messenger time: 1555 GCT. Weather: 02, cloud coverage 4. Wind: 080°, 15 kt. Sea: 3-5 ft. Wire angle: 33°. Depth of water: 3100 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.56	34.72	22.98	4.68	
26	25.56	34.70	22.96	4.68	
51	24.98	34.65	23.10	4.81	
76	23.42	34.96	23.80	4.91	
110	22.16	35.23	24.37	4.74	
144	20.27	35.01	24.72	4.54	
178	18.29	34.83	25.09	4.25	
259	11.21	34.31	26.22	2.59	
349	09.22	34.38	26.62	1.49	
434	07.84	34.36	26.82	1.01	
525	07.01	34.38	26.95	0.69	
563	07.12	34.43	26.98	0.82	
877	04.86	34.52	27.33	0.77	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.56	34.72	22.98	0.000	
10	25.56	34.72	22.98	0.049	
20	25.56	34.71	22.97	0.098	
30	25.57	34.71	22.97	0.147	
50	25.02	34.65	23.09	0.244	
75	23.43	34.95	23.79	0.356	
100	22.30	35.22	24.32	0.454	
150	20.08	34.98	24.74	0.628	
200	15.00	34.46	25.57	0.772	
250	11.90	34.31	26.09	0.884	
300	10.29	34.33	26.40	0.977	
400	08.27	34.36	26.75	1.131	
500	07.21	34.37	26.92	1.262	
600	06.50	34.41	27.04	1.379	
700	05.87	34.46	27.16	1.486	
800	05.27	34.50	27.27	1.582	

STATION 17

M/V Hugh M. Smith: Cruise 26, 14°56'N, 162°16'W, June 6, 1954. Messenger time: 1551 GCT. Weather: 15, cloud coverage 5. Wind: 080°, 19 kt. Sea: 3-5 ft. Wire angle: 20°. Depth of water: 3800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (μg at/l)
00	26.51	34.52	22.53	4.66	
55	26.49	34.51	22.53	4.66	
95	24.76	34.99	23.43	4.79	
135	23.88	35.23	23.87	4.73	
174	22.72	35.25	24.23	4.60	
219	18.56	34.88	25.06	4.16	
330	10.00	34.22	26.36	2.98	
444	07.96	34.34	26.78	1.14	
554	06.87	34.43	27.01	0.64	
664	06.00	34.47	27.16	0.62	
664	05.95	-	27.16	-	
879	04.90	34.45	27.27	0.82	
1094	04.27	34.54	27.41	1.11	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.51	34.52	22.53	0.000	1.964
10	26.51	34.52	22.53	0.053	1.911
20	26.51	34.52	22.53	0.106	1.857
30	26.50	34.52	22.53	0.160	1.804
50	26.50	34.51	22.53	0.266	1.697
75	25.25	34.86	23.17	0.395	1.569
100	24.62	35.05	23.52	0.513	1.451
150	23.59	35.25	23.97	0.724	1.240
200	21.25	35.14	24.55	0.912	1.052
250	14.30	34.50	25.76	1.057	0.907
300	11.29	34.26	26.16	1.164	0.800
400	08.49	34.29	26.66	1.334	0.630
500	07.39	34.39	26.91	1.470	0.494
600	06.47	34.46	27.09	1.586	0.378
700	05.72	34.46	27.18	1.689	0.275
800	05.21	34.45	27.24	1.785	0.178
1000	04.53	34.50	27.35	1.964	0.000

STATION 19

M/V Hugh M. Smith: Cruise 26, 13°54'N, 164°01'W, June 7, 1954. Messenger time: 1542 GCT. Weather: 02, cloud coverage 2. Wind: 080°, 21 kt. Sea: 8-12 ft. Wire angle: 26°. Depth of water: 2800 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	27.03	34.54	22.38	4.70	
38	27.04	34.60	22.43	4.77	
76	24.56	34.99	23.49	5.09	
119	23.04	35.32	24.18	4.73	
162	20.86	35.16	24.67	4.48	
210	16.71	34.69	25.36	4.04	
210	16.79	-	25.34	-	
316	10.49	34.47	26.47	1.00	
426	08.88	34.60	26.84	0.49	
533	07.66	34.60	27.03	1.06	
640	06.88	34.52	27.08	0.85	
851	05.53	34.56	27.28	1.16	
1065	04.45	34.60	27.44	1.03	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	27.03	34.54	22.39	0.000	1.838
10	27.03	34.54	22.39	0.055	1.783
20	27.03	34.57	22.41	0.109	1.729
30	27.04	34.59	22.42	0.164	1.674
50	25.92	34.79	22.92	0.268	1.570
75	24.60	34.98	23.47	0.386	1.452
100	23.72	35.20	23.90	0.492	1.346
150	21.64	35.25	24.53	0.681	1.157
200	17.96	34.81	25.16	0.841	0.997
250	12.79	34.46	26.04	0.965	0.873
300	10.84	34.45	26.40	1.059	0.779
400	09.22	34.58	26.77	1.213	0.625
500	08.00	34.61	26.99	1.340	0.497
600	07.19	34.54	27.05	1.455	0.383
700	06.48	34.53	27.14	1.563	0.275
800	05.84	34.55	27.24	1.662	0.176
1000	04.73	34.59	27.40	1.838	0.000

STATION 21

M/V Hugh M. Smith: Cruise 26, 12°35'N, 165°45'W, June 8, 1954. Messenger time: 1555 GCT. Weather: 02, cloud coverage 7. Wind: 070°, 12 kt. Sea: 3-5 ft. Wire angle: 25°. Depth of water: 2300 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	27.11	34.60	22.41	4.70	
37	27.12	34.52	22.34	4.74	
75	27.12	34.65	22.44	4.68	
122	23.38	35.08	23.91	4.85	
169	15.79	34.54	25.46	3.62	
225	11.36	34.65	26.46	0.54	
286	10.56	34.69	26.63	0.29	
387	09.46	34.69	26.82	0.44	
482	08.76	34.65	26.90	0.55	
582	07.91	34.61	27.00	0.72	
582	07.86	-	27.01	-	
779	06.50	34.60	27.19	0.81	
976	05.28	34.63	27.37	1.11	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	27.11	34.60	22.41	0.000	1.791
10	27.11	34.68	22.39	0.054	1.736
20	27.11	34.58	22.38	0.109	1.682
30	27.12	34.54	23.36	0.164	1.627
50	27.12	34.62	22.42	0.274	1.517
75	27.12	34.65	22.44	0.410	1.381
100	24.93	34.99	23.38	0.535	1.256
150	18.52	34.65	24.89	0.728	1.063
200	12.00	34.62	26.31	0.850	0.941
250	11.02	34.67	26.54	0.934	0.857
300	10.22	34.69	26.69	1.009	0.782
400	09.39	34.68	26.82	1.147	0.644
500	08.59	34.64	26.92	1.275	0.516
600	07.74	34.60	27.02	1.395	0.396
700	07.05	34.60	27.12	1.507	0.284
800	06.32	34.60	27.22	1.610	0.181
1000	05.20	34.63	27.38	1.791	0.000

STATION 23

M/V Hugh M. Smith: Cruise 26, 11°11'N, 167°26'W, June 9, 1954. Messenger time: first cast 1615 GCT, second cast 1655 GCT. Weather: 02, cloud coverage 3. Wind: 090°, 20 kt. Sea: 5-8 ft. Wire angle: first cast 34°, second cast 27°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	27.27	34.42	22.22	4.71	
32	27.26	34.42	22.22	4.69	
68	27.27	34.51	22.29	4.67	
113	24.72	34.58	23.13	4.44	
163	12.32	34.52	26.17	1.10	
235	10.65	34.72	26.64	0.46	
299	09.75	34.70	26.78	0.53	
506	08.37	34.61	26.93	0.72	
610	07.41	34.58	27.05	0.50	
610	07.46	-	27.04	-	
822	05.88	34.58	27.26	0.62	
865	-	-	-	-	
1021	04.92	34.56	27.36	0.40	
1048	-	-	-	-	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D_{1000} - \Delta D$ (dyn. m)
00	27.27	34.42	22.22	0.000	1.769
10	27.27	34.42	22.22	0.056	1.713
20	27.26	34.42	22.22	0.112	1.657
30	27.26	34.42	22.22	0.169	1.600
50	27.27	34.46	22.25	0.281	1.488
75	27.10	34.54	22.36	0.420	1.349
100	26.08	34.57	22.71	0.555	1.214
150	15.45	34.43	25.45	0.750	1.019
200	11.33	34.67	26.48	0.855	0.914
250	10.41	34.72	26.68	0.931	0.838
300	09.74	34.70	26.78	1.000	0.769
400	09.08	34.65	26.85	1.132	0.637
500	08.44	34.61	26.92	1.259	0.510
600	07.51	34.58	27.04	1.378	0.391
700	06.78	34.58	27.14	1.488	0.281
800	06.05	34.57	27.23	1.588	0.181
1000	04.95	34.57	27.36	1.769	0.000

STATION 25

M/V Hugh M. Smith: Cruise 26, 13°00'N, 168°13'W, June 10, 1954. Messenger time: 1548 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 18 kt. Sea: 8-12 ft. Wire angle: 32°. Depth of water: 2900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	27.14	34.58	22.38	4.62	
46	27.14	34.58	22.38	4.67	
93	24.28	34.70	23.35	4.71	
140	19.84	34.76	24.64	4.47	
186	14.78	34.47	25.63	3.02	
233	12.20	34.45	26.14	1.85	
281	10.72	34.61	26.54	0.74	
379	09.64	34.63	26.74	0.42	
472	08.78	34.63	26.88	0.52	
565	07.70	34.58	27.01	0.51	
565	07.65	-	27.02	-	
747	06.31	34.52	27.16	0.77	
931	05.10	34.54	27.32	0.88	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	27.14	34.58	22.38	0.000	1.839
10	27.14	34.58	22.38	0.055	1.784
20	27.14	34.58	22.38	0.109	1.730
30	27.14	34.58	22.38	0.164	1.675
50	27.14	34.58	22.38	0.274	1.565
75	26.50	34.61	22.60	0.409	1.430
100	23.80	34.71	23.50	0.543	1.296
150	18.63	34.71	24.91	0.732	1.107
200	13.81	34.44	25.81	0.866	0.973
250	11.58	34.52	26.31	0.967	0.872
300	10.47	34.62	26.59	1.050	0.789
400	09.45	34.63	26.77	1.195	0.644
500	08.44	34.62	26.93	1.326	0.514
600	07.35	34.57	27.05	1.444	0.396
700	06.61	34.53	27.12	1.553	0.286
800	05.92	34.52	27.20	1.655	0.184
1000	04.87	34.54	27.35	1.839	0.000

STATION 25A

M/V Hugh M. Smith: Cruise 26, 14°33'N, 168°25'W, June 11, 1954. Messenger time: 0427 GCT. Weather: 02, cloud coverage 2. Wind: 070°, 15 kt. Sea: 5-8 ft. Wire angle: 22°. Depth of water: 900 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.70	34.69	22.60	4.54	
28	26.52	34.72	22.68	4.55	
61	25.84	34.79	22.94	4.63	
103	24.74	35.03	23.46	4.78	
146	23.94	35.23	23.85	4.62	
207	18.94	34.83	24.92	3.91	
312	10.89	34.43	26.37	1.51	
423	08.58	34.47	26.79	0.74	
530	07.38	34.47	26.97	0.68	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	26.70	34.69	22.60	0.000	
10	26.65	34.70	22.63	0.052	
20	26.56	34.71	22.66	0.105	
30	26.47	34.73	22.71	0.156	
50	26.03	34.77	22.87	0.258	
75	25.41	34.87	23.14	0.381	
100	24.80	35.01	23.43	0.497	
150	23.92	35.23	23.86	0.713	
200	19.64	34.89	24.79	0.898	
250	15.00	34.61	25.69	1.039	
300	11.61	34.45	26.25	1.145	
400	08.93	34.46	26.73	1.309	
500	07.66	34.47	26.93	1.440	

STATION 27

M/V Hugh M. Smith: Cruise 26, 16°01'N, 168°36'W, June 11, 1954. Messenger time: 1614 GCT. Weather: 02, cloud coverage 3. Wind: 070°, 15 kt. Sea: 8-12 ft. Wire angle: 14°. Depth of water: 1200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.54	34.43	22.46	4.80	
46	26.56	34.45	22.47	4.71	
87	25.38	34.87	23.15	4.84	
144	23.70	35.17	23.88	4.63	
200	19.11	34.88	24.92	4.18	
272	14.30	34.47	25.73	3.60	
338	10.65	34.27	26.29	2.96	
458	07.48	34.27	26.80	1.21	
571	06.52	34.27	26.93	0.97	
684	05.72	34.45	27.18	1.19	
904	04.80	34.65	27.44	1.03	
1126	03.96	-	-	1.27	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	26.54	34.43	22.46	0.000	
10	26.54	34.43	22.46	0.054	
20	26.55	34.44	22.46	0.108	
30	26.55	34.44	22.46	0.162	
50	26.50	34.48	22.51	0.270	
75	25.73	34.75	22.95	0.399	
100	24.91	34.98	23.37	0.518	
150	23.48	35.17	23.94	0.733	
200	19.11	34.88	24.92	0.913	
250	15.63	34.58	25.53	1.055	
300	12.70	34.36	25.98	1.172	
400	08.49	34.27	26.64	1.352	
500	07.10	34.27	26.85	1.491	
600	06.27	34.32	27.00	1.613	
700	05.63	34.47	27.20	1.719	
800	05.20	34.56	27.32	1.811	
1000	04.41	-	-	-	

STATION 29

M/V Hugh M. Smith: Cruise 26, 17°55'N, 169°37'W, June 12, 1954. Messenger time: 1605 GCT. Weather: 02, cloud coverage 3. Wind: 080°, 16 kt. Sea: 5-8 ft. Wire angle: 14°. Depth of water: 2700 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.13	34.79	22.86	4.75	
47	25.18	35.12	23.40	4.89	
88	24.40	35.30	23.77	4.92	
145	22.49	35.35	24.37	4.59	
202	19.84	35.21	24.98	4.50	
260	16.10	34.69	25.51	4.23	
343	10.96	34.27	26.24	3.31	
462	08.10	34.23	26.67	2.25	
575	06.32	34.33	27.00	1.23	
688	05.68	34.49	27.21	1.21	
909	04.75	34.54	27.36	1.15	
1128	03.98	34.58	27.48	1.21	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.13	34.79	22.86	0.000	1.915
10	26.13	34.79	22.86	0.050	1.865
20	26.13	34.79	22.86	0.100	1.815
30	26.13	34.79	22.86	0.150	1.765
50	25.01	35.16	23.48	02.45	1.670
75	24.59	35.27	23.69	0.354	1.562
100	24.21	35.32	23.84	0.458	1.457
150	22.23	35.35	24.44	0.651	1.264
200	19.89	35.21	24.97	0.818	1.098
250	16.78	34.78	25.42	0.961	0.954
300	13.40	34.41	25.87	1.084	0.832
400	09.45	34.22	26.45	1.279	0.637
500	07.42	34.24	26.78	1.430	0.485
600	06.12	34.38	27.07	1.553	0.363
700	05.64	34.49	27.22	1.655	0.260
800	05.21	34.52	27.29	1.748	0.168
1000	04.45	34.56	27.41	1.915	0.000

STATION 29A

M/V Hugh M. Smith: Cruise 26, 19°37'N, 169°50'W, June 13, 1954. Messenger time: 0438 GCT. Weather: 02, cloud coverage 2. Wind: 060°, 14 kt. Sea: 3-5 ft. Wire angle: 11°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.23	34.85	22.87	4.45	
15	26.20	34.90	22.92	4.28	
41	25.46	35.17	23.35	4.61	
89	24.49	35.19	23.66	4.72	
144	22.54	35.41	24.39	4.52	
196	20.33	35.23	24.87	4.19	
313	12.88	34.42	25.99	4.04	
419	08.95	34.23	26.54	3.36	
521	06.48	34.56	27.16	2.76	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.23	34.85	22.87	0.000	
10	26.21	34.89	22.91	0.050	
20	26.19	34.92	22.93	0.099	
30	25.53	35.16	23.32	0.147	
50	25.30	35.18	23.41	0.238	
75	24.90	35.18	23.53	0.349	
100	24.13	35.21	23.78	0.457	
150	22.35	35.41	24.45	0.650	
200	20.13	35.20	24.90	0.818	
250	16.91	34.81	25.41	0.963	
300	13.66	34.48	25.87	1.086	
400	09.54	34.23	26.45	1.281	
500	06.92	34.46	27.03	1.422	

STATION 31

M/V Hugh M. Smith: Cruise 26, 19°59'N, 169°12'W, June 13, 1954. Messenger time: 1615 GCT. Weather: 02, cloud coverage 2. Wind: 090°, 3 kt. Sea: 3-5 ft. Wire angle: 02°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.90	35.01	23.09	4.74	
27	25.81	35.10	23.19	4.77	
64	24.54	35.44	23.83	4.93	
118	22.67	35.32	24.29	4.96	
181	20.70	35.43	24.92	4.56	
252	16.46	34.67	25.41	4.51	
327	13.06	34.54	26.04	4.39	
439	09.10	-	-	3.79	
545	06.66	-	-	1.22	
656	05.76	34.29	27.04	1.24	
871	04.67	34.45	27.30	1.16	
1076	04.06	34.58	27.47	1.40	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D 1000 - \Delta D$ (dyn. m)
00	25.90	35.01	23.09	0.000	1.910
10	25.87	35.04	23.12	0.048	1.862
20	25.85	35.08	23.16	0.095	1.814
30	25.80	35.12	23.21	0.142	1.767
50	24.72	35.42	23.76	0.231	1.679
75	24.28	35.43	23.90	0.334	1.576
100	23.41	35.36	24.11	0.432	1.477
150	21.79	35.36	24.57	0.615	1.294
200	19.52	35.23	25.08	0.776	1.134
250	16.56	34.68	25.39	0.917	0.992
300	14.22	34.58	25.84	1.040	0.870
400	10.38	34.32	26.37	1.239	0.671
500	07.52	34.22	26.75	1.396	0.514
600	06.11	34.26	26.98	1.524	0.385
700	05.49	34.32	27.10	1.636	0.273
800	04.99	34.40	27.23	1.737	0.173
1000	04.26	34.54	27.41	1.910	0.000

STATION 33

M/V Hugh M. Smith: Cruise 26, 21°05'N, 168°16'W, June 14, 1954. Messenger time: 1605 GCT. Weather: 02, cloud coverage 2. Wind: 090°, 4 kt. Sea: 3-5 ft. Wire angle: 17°. Depth of water: 2400 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.31	35.17	23.40	4.55	
24	25.24	35.23	23.46	4.64	
49	24.56	35.26	23.69	4.45	
97	22.96	35.30	24.19	4.71	
146	21.27	35.35	24.70	4.52	
199	19.76	35.21	25.01	4.52	
298	14.36	34.45	25.71	4.23	
401	10.24	34.27	26.36	2.95	
499	07.90	34.25	26.72	1.71	
602	06.38	34.29	26.96	1.26	
804	05.10	34.40	27.21	1.00	
1004	04.48	34.54	27.39	1.14	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.31	35.17	23.39	0.000	1.915
10	25.29	35.19	23.42	0.045	1.870
20	25.26	35.22	23.45	0.090	1.826
30	25.09	35.25	23.52	0.134	1.781
50	24.54	35.26	23.70	0.220	1.695
75	23.80	35.28	23.93	0.323	1.592
100	22.63	35.31	24.30	0.419	1.496
150	21.18	35.35	24.73	0.594	1.321
200	19.75	35.20	25.00	0.753	1.162
250	17.13	34.78	25.33	0.898	1.018
300	14.22	34.44	25.73	1.025	0.890
400	10.30	34.27	26.35	1.233	0.682
500	07.88	34.25	26.72	1.393	0.522
600	06.40	34.29	26.96	1.524	0.392
700	05.60	34.34	27.10	1.636	0.279
800	05.11	34.40	27.21	1.738	0.177
1000	04.47	34.54	27.39	1.915	0.000

STATION 35

M/V Hugh M. Smith: Cruise 26, 20°51'N, 166°48'W, June 15, 1954. Messenger time: 1608 GCT. Weather: 15, cloud coverage 5. Wind: 060°, 8 kt. Sea: 5-8 ft. Wire angle: 16°. Depth of water: 2200 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.81	35.10	23.19	4.74	
25	25.80	35.10	23.19	4.77	
51	24.54	35.16	23.62	4.99	
101	22.40	35.25	24.31	4.88	
152	19.70	35.03	24.88	4.31	
207	16.94	34.72	25.33	4.26	
308	11.19	34.20	26.14	3.92	
414	08.06	34.13	26.60	3.15	
515	06.32	34.14	26.85	1.66	
621	05.44	34.25	27.05	1.08	
828	04.69	34.42	27.27	1.06	
1029	04.16	34.52	27.41	1.27	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	ΔD 1000 - ΔD (dyn. m)
00	25.81	35.10	23.19	0.000	1.810
10	25.81	35.10	23.19	0.047	1.764
20	25.80	35.10	23.19	0.094	1.717
30	25.79	35.10	23.20	0.141	1.670
50	24.59	35.15	23.60	0.231	1.579
75	23.60	35.21	23.94	0.335	1.475
100	22.46	35.24	24.29	0.432	1.379
150	19.89	35.05	24.85	0.604	1.207
200	17.27	34.76	25.28	0.752	1.058
250	14.44	34.45	25.69	0.882	0.929
300	11.55	34.22	26.09	0.992	0.819
400	08.44	34.13	26.54	1.171	0.639
500	06.50	34.14	26.83	1.316	0.495
600	05.58	34.23	27.02	1.437	0.373
700	05.09	34.34	27.16	1.544	0.267
800	04.72	34.41	27.26	1.639	0.171
1000	04.22	34.50	27.39	1.810	0.000

STATION 37

M/V Hugh M. Smith: Cruise 26, 21°14'N, 164°11'W, June 16, 1954. Messenger time: 1600 GCT. Weather: 02, cloud coverage 3. Wind: 060°, 2 kt. Sea: 3-5 ft. Wire angle: 00°. Depth of water 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	26.04	34.65	22.78	4.52	
27	25.70	34.78	22.98	4.63	
49	25.16	34.92	23.25	4.70	
106	23.42	35.26	24.03	4.59	
159	21.29	35.17	24.56	4.42	
218	18.36	34.92	25.14	4.05	
324	11.72	34.25	26.08	3.95	
435	07.86	34.13	26.63	2.87	
541	06.41	34.14	26.84	1.64	
652	05.62	34.25	27.03	1.01	
866	04.74	34.45	27.29	1.13	
1072	04.14	34.54	27.43	1.16	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	26.04	34.65	22.78	0.000	1.942
10	26.02	34.67	22.80	0.051	1.892
20	25.92	34.70	22.86	0.101	1.841
30	25.61	34.81	23.03	0.151	1.792
50	25.15	34.93	23.26	0.246	1.697
75	24.51	35.07	23.56	0.358	1.584
100	23.65	35.23	23.94	0.463	1.479
150	21.70	35.20	24.47	0.653	1.290
200	19.40	35.02	24.95	0.819	1.124
250	16.35	34.69	25.45	0.962	0.981
300	13.11	34.34	25.88	1.083	0.860
400	08.71	34.14	26.51	1.275	0.668
500	06.90	34.13	26.77	1.424	0.519
600	05.95	34.20	26.95	1.552	0.390
700	05.40	34.30	27.09	1.666	0.277
800	04.94	34.39	27.22	1.766	0.176
1000	04.32	34.51	27.38	1.942	0.000

STATION 39

M/V Hugh M. Smith: Cruise 26, 20°51'N, 161°59'W, June 17, 1954. Messenger time: 1607 GCT. Weather: 02, cloud coverage 2. Wind: calm. Sea: 3-5 ft. Wire angle: 07°. Depth of water: 2600 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.89	34.81	22.95	4.63	
26	25.68	34.81	23.01	4.78	
52	25.07	34.87	23.24	4.90	
104	23.86	35.19	23.85	4.82	
157	22.67	35.30	24.28	4.81	
215	19.68	35.07	24.92	4.26	
319	13.03	34.27	25.84	3.89	
429	08.88	34.16	26.50	2.90	
533	06.82	34.13	26.78	1.72	
642	05.87	34.25	27.00	1.07	
854	04.88	34.42	27.25	0.99	
1058	04.22	34.51	27.40	1.12	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.89	34.81	22.94	0.000	2.026
10	25.88	34.81	22.95	0.049	1.976
20	25.79	34.81	22.97	0.098	1.927
30	25.61	34.81	23.03	0.147	1.878
50	25.18	34.86	23.20	0.243	1.783
75	24.60	34.98	23.47	0.357	1.668
100	23.99	35.16	23.78	0.465	1.560
150	22.79	35.30	24.24	0.664	1.362
200	20.39	35.14	24.78	0.840	1.186
250	17.45	34.81	25.28	0.991	1.035
300	14.24	34.41	25.70	1.121	0.905
400	09.83	34.17	26.35	1.329	0.696
500	07.38	34.13	26.70	1.490	0.536
600	06.20	34.19	26.91	1.624	0.402
700	05.55	34.30	27.08	1.740	0.286
800	05.08	34.38	27.20	1.843	0.182
1000	04.41	34.48	27.35	2.026	0.000

STATION 41

M/V Hugh M. Smith: Cruise 26, 21°17'N, 160°01'W, June 18, 1954. Messenger time: 1628 GCT. Weather: 02, cloud coverage 4. Wind: 080°, 10 kt. Sea: 5-8 ft. Wire angle: 27°. Depth of water: 2500 f.

OBSERVED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	O_2 (ml/l)	PO_4-P (µg at/l)
00	25.60	34.88	23.09	4.77	
22	24.12	35.14	23.73	5.03	
45	23.00	35.26	24.15	5.10	
89	21.96	35.26	24.44	4.89	
134	20.92	35.28	24.75	4.78	
183	19.08	34.99	25.01	4.43	
273	13.77	34.36	25.76	3.91	
366	10.22	34.16	26.28	3.40	
456	08.20	34.18	26.62	2.14	
549	06.66	34.22	26.87	1.30	
733	05.02	34.38	27.21	0.72	
912	04.37	34.49	27.36	0.93	

INTERPOLATED AND CALCULATED

DEPTH (m)	T (°C)	S (°/oo)	σ_t	ΔD (dyn. m)	$\Delta D\,1000 - \Delta D$ (dyn. m)
00	25.60	34.88	23.09	0.000	
10	25.60	34.88	23.09	0.048	
20	24.22	35.13	23.70	0.093	
30	23.70	35.20	23.90	0.134	
50	22.84	35.27	24.20	0.212	
75	22.25	35.26	24.36	0.304	
100	21.62	35.27	24.55	0.392	
150	20.39	35.23	24.85	0.558	
200	18.10	34.85	25.15	0.710	
250	14.73	34.45	25.62	0.843	
300	12.65	34.27	25.92	0.959	
400	09.38	34.16	26.42	1.154	
500	07.43	34.20	26.75	1.309	
600	06.08	34.26	26.98	1.437	
700	05.26	34.35	27.15	1.546	
800	04.72	34.42	27.27	1.642	

REVIEW OF THE OCEANOGRAPHIC PROGRAMS OF THE PACIFIC OCEANIC FISHERY INVESTIGATIONS

E. Dixon Stroup and Thomas S. Austin

Abstract--The Pacific Oceanic Fishery Investigations (POFI), U. S. Fish and Wildlife Service, has, since early 1950, been engaged in oceanographic surveys of the tropical and subtropical central Pacific, and since last year the northern temperate central Pacific. These studies support POFI's exploratory fishing program, stressing the location of areas of enrichment and increased productivity in the upper layers. The tabulated data from the cruises, together with vertical sections of the measured fields and brief descriptive texts, are published as Special Scientific Reports of the U. S. Fish and Wildlife Service. In the tropical central Pacific, standard oceanographic work is nearing completion, with reports published on seven cruises crossing and defining the equatorial current system (lat. 15°N-10°S, long. 140°W-180°). Similar reports on seven cruises in Hawaiian Islands offshore waters and three cruises to temperate waters north of Hawaii (lat. 25°N-40°N, long. 140°-170°E.) are in preparation. Plans for 1955 include a reconnaissance oceanographic cruise to the equatorial eastern Pacific in cooperation with Scripps Institution of Oceanography and the Peruvian Hydrographic Office, and participation in NORPAC, a joint survey of the entire Pacific north of 25°N. latitude during July, August, and September by POFI, SIO, the State of California, University of Washington, Pacific Oceanic Group of Canada, and Japanese agencies.

The Pacific Oceanic Fishery Investigations (POFI) of the U. S. Fish and Wildlife Service operates two boats equipped for offshore oceanographic surveys: the Hugh M. Smith, a 128-ft vessel of the west-coast tuna clipper design, and the Charles H. Gilbert, 112 ft, designed and built for oceanic fishery and oceanographic investigations. A third vessel, the 85-ft John R. Manning, is used exclusively in fishing surveys.

The POFI oceanographic programs supplement associated biological investigations; this has had important effects on the type of oceanographic studies made. Basically, observations at sea have been mostly limited to the upper 1000 m or less, with emphasis on processes occurring in the euphotic zone. Detailed investigations have been made of certain features of the circulation thought to be of importance biologically, to the exclusion of other features perhaps just as prominent from a physical viewpoint. In particular, close attention has been given to areas where the normal stability of the upper layers is in any way disturbed. This stability, very highly developed in the equatorial region, greatly restricts the replenishment of nutrients in the surface layer from below; any situation allowing this replenishment may be of extreme importance to the productivity of the region. As reviewed by SETTE [in press], locations where these conditions may occur include areas of surface divergence and upwelling, areas affected by the presence of islands, and areas of intensive mixing due to great horizontal or vertical shear (such as current boundaries and eddies); each of these has received close attention in the investigations. The measurements made - besides those essential to a basic understanding of the circulation - have been of the fields of such dissolved substances as phosphate and oxygen, which are of immediate and relatively obvious significance biologically. Quantitative zooplankton collections were made to provide a biological index of the productivity.

In order to get the oceanographic data as rapidly as possible into the hands of those who will use it, most reports so far published include only brief descriptions of methods and salient features, tabulated observed and interpolated data, plots, and vertical sections. These publications, Special Scientific Reports of the Fish and Wildlife Service, can be obtained on request from the POFI office in Honolulu. A few reports have appeared elsewhere; a list of all publications dealing with POFI oceanographic cruises is given at the end of this paper. A complete POFI bibliography and a comprehensive review of all oceanographic and biological results to 1954 are also available [SETTE, 1954].

Progress in oceanographic studies--The two areas in which POFI began surveys were the Hawaiian offshore waters and the tropical central Pacific. The first of these is the location of a

as will specialized problems to be investigated. The productive cooperation possible between phy ical and biological investigations is being amply demonstrated; if in the process vast oceanic are are being described in heretofore unattainable detail it may be considered as a most welcome bon

APPENDIX 1--List of Publications Utilizing Oceanographic Data Collected by POFI

AUSTIN, THOMAS S., Mid-Pacific oceanography, part 3, transequatorial waters, Aug.-Oct. 1951, Spec. Sci. Rep.-Fish. 131, 17 pp., 13 fig., 49 sta., 1954a.

AUSTIN, THOMAS S., Mid-Pacific oceanography, part 5, transequatorial waters, May-June 1952, Aug. 1952, Spec. Sci. Rep.-Fish. 136, 86 pp., 1954b.

CROMWELL, TOWNSEND, Mid-Pacific oceanography, January through March, 1950, Spec. Sci. R Fish. 54, 9 pp., 17 fig., 53 sta., 1951.

CROMWELL, TOWNSEND, Circulation in a meridional plane in the central equatorial Pacific, J. Mar. Res., v. 12, pp. 196-213, 9 fig., 1953.

CROMWELL, TOWNSEND, Mid-Pacific oceanography, part 2, transequatorial waters, June-Aug. 1950, Jan.-Mar. 1951, Spec. Sci. Rep.-Fish. 131, 13 pp., 32 fig., 106 sta., 1954.

CROMWELL, TOWNSEND, R. B. MONTGOMERY, and E. D. STROUP, Equatorial undercurrent in Pacific Ocean revealed by new methods, Science, v. 119, pp. 648-649, 1954.

MONTGOMERY, R. B., Analysis of a Hugh M. Smith oceanographic section from Honolulu southw across the equator, J. Mar. Res., v. 13, pp. 67-75, 1954.

SETTE, O. E., Consideration of mid-ocean fish production as related to oceanic circulatory syst J. Mar. Res., in press.

SETTE, O. E., and STAFF OF POFI, Progress in Pacific Oceanic Fishery Investigations 1950-5 Spec. Sci. Rep.-Fish. 116, 75 pp., 1954.

STROUP, E. D., Mid-Pacific oceanography, part 4, transequatorial waters, January-March, 1952 Spec. Sci. Rep.-Fish. 135, 52 pp., 1954.